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No. 1

SYSTEMATIC NOTES ON NORTH AMERICAN TACHINIDÆ.*

BY JOHN D. TOTHILL, DIVISION OF ENTOMOLOGY, OTTAWA.

The following is the first of a series of articles on Tachinidæ which the writer hopes to publish in this journal from time to time. They will be of a strictly systematic nature and emphasis will be laid upon Canadian species. This present article contains a description of a new Canadian species of *Winthemia* together with a key for the separation of the North American species of the genus known at the present time; it also contains suggestions for improvement at two difficult points in Mr. Coquillett's generally excellent key to the genera in his "Revision of the N. American Tachinidæ."

Winthemia Desv.

In the course of a study of the parasites of the Spruce Budworm (*Tortrix fumiferana* Clemens) in Canada by the Division of Entomology a new species of *Winthemia* was reared in considerable numbers. A description of this species, which is here named *W. fumiferana* after its host, together with a key for the separation of the North American species of the genus follows.

The genus *Winthemia* Desv. ("Essai sur les Myodaires," p. 173, 1830), is represented in North America by four known species. One of these, *W. quadripustulata* Fab., is an exceedingly variable species. The writer has examined the types of *W. obscura* Coq. and *W. antennalis* Coq. and there seems to be little doubt but that they are both good species. For the privilege of examining these types and for numerous other courtesies while at the United States National Museum the writer is indebted to the authorities of that institution and more particularly to Mr. Frederick Knab.

The four species may be separated as follows:—

1. With 3 sternopleural bristles 2.
- With 2 sternopleural bristles 3

*Contributions from the Division of Entomology, Ottawa.

2. With 3 postsutural bristles, 3rd joint of antenna nearly 3 times as long as 2nd ; arista thickened almost to middle. *obscura* Coq.
 With 4 postsutural bristles, 3rd joint of antenna $1\frac{1}{4}$ times as long as 2nd ; arista thickened on basal $\frac{1}{3}$ *fumiferanæ*, n. sp.
3. Palpi, scutellum and apex of abdomen black. *antennalis* Coq.
 Palpi, scutellum and apex of abdomen yellowish. *quadripustulata* Fab.

Winthemia fumiferanæ, n. sp.

Black species with palpi, scutellum and usually antennæ and sides of 2nd and 3rd segments of the abdomen yellowish ; thorax, abdomen and legs lightly dusted with whitish pollen ; 4 postsutural and 3 sternopleural bristles ; hind legs ciliate. Length, 7-9 mm.

Head $\frac{3}{4}$ times as broad as long ; front in male $\frac{1}{3}$ width of eye, in female equal to width of eye ; frontal vitta in female $1\frac{1}{2}$ times width of parafrontal plate (measurements taken immediately anterior to ocellar triangle) ; parafacials at narrowest point $\frac{1}{4}$ as wide as facial plate at widest point ; genæ $\frac{1}{6}$ eye height ; antennæ reaching to lowest $\frac{1}{4}$ of face, 3rd joint in both sexes $1\frac{1}{4}$ times length of 2nd ; arista thickened on basal $\frac{1}{3}$, 2nd joint $1\frac{1}{2}$ times as long as broad. Colour of head except eyes whitish pollinose on black ground ; frontal vitta black ; frontalia, parafacialia, facial plate, occiput and genæ whitish pollinose on black ground ; antennæ varying from black to yellowish in all its segments, palpi yellow. A strong pair of proclinate ocellar bristles in both sexes ; females with two pair of, males without orbital bristles ; frontal bristles to, or slightly beyond base of second antennal joint ; parafacials with numerous fine black hairs on upper $\frac{2}{3}$; bristles of facialia on lower $\frac{1}{4}$ only.

Thorax including the pleuræ light grey pollinose on a black ground, the pollen being somewhat irregularly distributed ; scutellum blackish at base and yellowish at apex, the extent of yellowish area varying in different specimens. Four pairs of postsutural dorsocentral bristles (in one specimen only 3 pairs), 3 pairs of postacrostichals and three sternopleurals, the latter usually strong but the lower one absent on one side in one specimen ; scutellum with three strong pairs of marginal, and a pair of cruciate apical and several weak discal bristles.

Legs black ; coxæ and femora strongly, tibiæ and tarsi faintly, whitish pollinose ; middle tibiæ with 2 or 3 bristles on front side near the middle ;

hind tibiæ ciliate but with two longer bristles near the middle ; tarsal claws and pulvilli considerably longer in the male than in the female.

Wings hyaline, becoming somewhat fuscous toward base. Vein M_{4+5} with one to five bristles near base ; the medium cross vein quite distinctly S shaped ; there is no appendage at bend of R_{1+2} ; the anterior end of medium cross vein is situate at $\frac{1}{3}$ distance from the bend of R_{1+2} to radio medial cross vein.

Abdomen black and polished on the whole of first segment and on posterior margins of the other segments ; the narrow anterior margins of segments 2, 3 and 4 white pollinose ; the median fascia irregularly white pollinose on black ground ; sides of segments 2 and 3 sometimes yellowish. A pair of median marginal macrochætæ on segments 1 and 2, a row of very long marginals on segment 3 ; no discal bristles on segments 2 and 3 ; all the segments are thickly covered with rather long fine hairs, which, especially medially, are erect and not proclinate ; fourth segment covered on disc with fine bristles about $\frac{3}{4}$ length of marginal macrochætæ on segment 3.

Described from 18 males and 18 females bred in the Division from the Spruce Budworm (*Tortrix fumiferana* Clemens). The localities are as follows : Two males and one female from Maniwaki, Province of Quebec ; 16 males and 17 females from Duncans, British Columbia, Canada. The adults issued from both larvæ and pupæ, but principally the latter, of the host. Type female from Duncans, B.C., and 33 co-types deposited with Division of Entomology, Experimental Farms, Ottawa ; 2 co-types a male and female from Duncans, B. C., deposited in the United States National Museum, Washington, D. C.

Amobia distincta Towns., and *Senotainia trilineata* V. & W.

In a recent attempt by the writer to determine with the aid of Coquillett's "Revision" some Tachinids that have since proved to *Senotainia trilineata* V. & W., considerable difficulty was experienced in deciding whether the species was the above mentioned or *Amobia distincta* Towns.; moreover reference to the original description did not materially facilitate the determination. From an examination of a large series of both species in the United States National Museum it was found that they are abundantly distinct and that the generic separation is fully justified. The following is a table, which it is hoped may prove useful, of some of the more obvious differences between the two species :—

Amobia distincta Towns.*Senotainia trilineata* V. & W.

- | | |
|---|---|
| 1. Radiomedial cross vein far before tip of R_{2+3} .
2. Palpi black.
3. Parafacials at narrowest point at least 1.5 times length of 3rd antennal joint.
4. The three black thoracic vittæ, broad and conspicuous.
5. The abdominal markings (three rows of black triangles on yellowish gray ground) very distinct even without lens, especially in male.
6. Female with piercing ovipositor. | 1. Radiomedial cross vein at or close to tip of R_{2+3} .
2. Palpi yellow.
3. Parafacials at narrowest point about equal to length of 3rd antennal joint.
4. The three or four black thoracic vittæ narrow and inconspicuous.
5. The abdominal markings not all distinct.
6. Female without piercing ovipositor. |
|---|---|

Tachinophyto variabilis Coq., and *floridensis* Towns.

Tachinophyto Towns., Trans. Amer. Ent. Soc., Vol. 19, p. 130, 1892, generic synonymy.

Pseudomyothria Towns., 1892, loc. cit.

Methypostena Towns., 1908, Tax of Musc. Flies.

Lixophaga Towns., 1908, Tax of Musc. Flies.

Hypostena of authors (non Meig).

The above synonymy is pointed out by Mr. D. W. Coquillett in his recent and valuable paper "The Type Species of North American Genera of Diptera," p. 611.

In the "Revision," page 62, key section No. 7, two species of the above genus are separated, namely, *variabilis* Coq., and *floridensis* Towns. The key reads as follows:—

- "7. Third segment of abdomen pollinose on at least the basal two-thirds, the pollen yellowish, abdomen subopaque ;
 length, 4-9 mm *variabilis* Coq.
 "Third segment at most pollinose on the basal third, the pollen white, abdomen subshining ; length, 4-9 mm... *floridensis* Towns."

The characters made use of are purely colorational and since the publication of Coquillett's valuable "Revision" larger series of the two species have been accumulated which clearly demonstrate that such

characters, at least in *variabilis*, are subject to great variation. A recent examination of the types and of the series both at the Gipsy Moth Parasite Laboratory and at the United States National Museum by the writer brings out two points, i.e., that the species are abundantly distinct and that the pollinosity on the third segment of the abdomen in *variabilis* varies all the way from the typical condition to the condition met with in typical *floridensis*. The following conspicuous structural differences will serve to separate the species :—

T. variabilis Coq.*T. floridensis* Tn.

- | | |
|--|---|
| 1. Third joint of antennæ 3.5 to 4 times length of 2nd.
2. Costal spine very inconspicuous. | 1. Third joint of antennæ 2 to 2.5 times length of 2nd.
2. Costal spine strongly developed and very conspicuous. |
|--|---|

(To be continued.)

NOTES ON THE PARASITIC HYMENOPTERA.

BY A. A. GIRAULT, BRISBANE, AUSTRALIA.

Superfamily Chalcidoidea.

Family Encyrtidæ.

Subfamily Encyrtinæ.

Tribe Arrhenophagini.

Genus *Rhopoideus* Howard.

1. *Rhopoideus fuscus*, new species.

Dr. C. Gordon Hewitt, Dominion Entomologist, Ottawa, Canada, has sent me among other things eight specimens of an Encyrtine bearing acute edentate mandibles, which agree well with the genus *Rhopoideus* Howard. This species, however, has but 9-jointed antennæ, counting a very short, almost imperceptible ring-joint; its antennal club is solid. Now Ashmead gives as a diagnostic character of the genus in question 10-jointed antennæ (the funicle 5-jointed, no ring-joint mentioned), which would imply at least a 2-jointed antennal club. The original description of *Rhopoideus* leaves one in doubt as to the total number of antennal joints, the only statement made concerning them being to the effect that the funicle is 5-jointed. Nevertheless, this Canadian species agrees so well with the generic description, even to the possible hosts, except in the antennæ, that we have reason to question Ashmead's statement concerning the latter. With this species the funicle is 5-jointed, the first three joints

"small and narrow, each rather broader than long, 4 and 5 broader and longer and as broad as long," as described for the type species, except that in each case here the joints are longer than wide. The antennæ of this species appear to agree in general form with those of the type of *Rhopoideus*.*

Female.—Length, 1.95 mm. Rather long and slender, the body flattened or depressed.

General colour uniformly brown, but the abdomen somewhat paler, the brown emphasized along the caudal margins of the segments (making at least four transverse brown stripes across the abdomen, which, however, are not conspicuous). Antennæ concolorous; legs somewhat lighter, with some yellow, the tarsi pallid yellowish, the distal tarsal joint clouded. Eyes dark. Wings hyaline, with the exception of a slight cloud of fuscous under the stigmal vein and just out a slight distance from the base, and also sometimes slightly touched with fuscous along the caudal margin irregularly, proximad and along the oblique hairless line at either margin of it. Trochanters and bulbs of the antennæ pallid.

Mesoscutum and mesoscutellum polygonally sculptured, as if covered with flat scales, both bearing a few, sparse, short setæ; the concave face finely lined with circular lines (concentric about the rather deep and large, crescentic scrobicular cavity in about the centre of the face); carina of vertex present; tarsi 5-jointed, the joints short yet longer than wide; tibial spurs single, the cephalic spur curved and forked at tip; caudal femora somewhat thickened, legs otherwise slender or usual. Fore wings with an oblique, hairless line running proximo-caudad from the origin of the stigmal vein. Mandibles short, claw-shaped, acute and edentate at tip. Submarginal vein long and slender, the costal cell rather wide, the marginal vein a mere rounded point where the submarginal touches the cephalic margin, the postmarginal vein absent, the stigmal vein distinct, moderate in length, with a slender neck. Fore wing (including the costal cell) densely, finely ciliated, the blade ample and wide, only about twice longer than broad, the marginal cilia short, becoming noticeable only at apex and disto-caudad, where they are moderately short. Caudal wings densely ciliate discally, rather short. Parapsidal furrows absent. Abdomen

*Dr. L. O. Howard has very kindly examined the type of his *Rhopoideus citrinus* for me, and tells me in a letter dated August 8, 1911, that the antennal club of that species is solid, hence the antennæ 8-jointed (excluding any question of a ring-joint). Ashmead's diagnosis of the genus is therefore wrong.

longer than the thorax, cylindrical but pointed at the apex, the valves of the ovipositor slightly extruded. Ocelli in a slightly curved line. Scutellum peltate, angular, as wide as long or nearly. Cephalic aspect of head nearly quadrate.

Antennæ 9-jointed; scape long and slender, slightly thickened in the middle, the bulb rather long, both together over twice longer than the pedicel; the latter obconic, rather long, over twice longer than wide; a very flat, short ring-joint, which has the shape of a mushroom; funicle joints 1-3 short, 4 and 5 longer and wider; 1 and 2 subequal, each slightly longer than wide; 3 of same width but slightly longer; 4 a third longer and broader than 3; and 5 a third longer and broader than funicle joint 4; all much shorter than the pedicel, which is subequal in length to the combined lengths of the first three funicle joints; club solid, long and cylindrical, obtusely pointed, not quite as long as the funicle. Pubescence of antenna short, not dense or conspicuous.

(From eight specimens, $\frac{2}{3}$ -inch objective, 1-inch optic, Bausch and Lomb.)

Male.—Unknown.

Described from eight specimens mounted singly on slides, received for identification from Dr. C. Gordon Hewitt, as noted above, each slide labelled "from spruce budworm material, Province of Quebec," and respectively, "Maniwaki, 27, VI, 11," and "Montcalm, 6, VII, 11," two females, two slides (homotypes in Canada); "Chicoutimi, 3, VII, 11," and "St. Gabriel de Brandon, 3, VII, 11," two females, two slides co-types, as noted below); "Chicoutimi, 3, VII, 11," and "Montcalm, 6, VII, 11," two females, two slides (types); and "Chicoutimi, 3, VII, 11, two females, two slides (homotypes in collection Illinois State Laboratory of Natural History). The supposed host is *Tortrix fumiferana* Clemens, but a coccid is indicated instead. Other coccid parasites, some noted beyond, were reared from the same host material.

Habitat.—Dominion of Canada—Quebec (Chicoutimi, Maniwaki, Montcalm and St. Gabriel de Brandon).

Types.—Cat. No. 14,206, United States National Museum, Washington, D. C., the two females as indicated above. *Co-types*: Accession No. 45,080, Illinois State Laboratory of Natural History, Urbana, U. S. A., the two females, two slides as indicated above. *Homotypes*: The two females as above indicated, in the collections of the Division of Entomology, Central Experimental Farm, Ottawa, Canada, and the two

indicated as being in the collections of the Illinois State Laboratory of Natural History (Accession No. 45,085).

This species evidently differs considerably from the type species, *citrinus* Howard; it must be considerably larger and more slender, the colour is brown, not light orange; the mesonotum is differently sculptured, namely, polygonally, not finely, transversely lined; the sheaths of the ovipositor not nearly black at tip but concolorous; the joints of the funicle somewhat longer, and the antennal club shorter, not as long as the funicle, even; and no oblique hairless line on the fore wing is noted for the type species, nor a ring-joint in the antennæ.

Family Pteromalidæ.

Subfamily Sphegigasterinæ

Tribe Sphegigasterini.

Genus *Urios* Girault MS.

1. *Urios vestali* Girault.

This nearly wingless species, which was described in the Journal of the New York Entomological Society (December, 1911), was captured by Mr. A. G. Vestal at the Devil's Hole, near Havana, Illinois. It was found in an ant's nest (*Pheidole vinelandica* Forel.), April 1, 1911. The nest of the ant was in sandy soil, in a bunch grass area. Mr. Vestal stated that, casually, he was unable to distinguish the pteromalid from the ants. In other words, it closely mimics the host ant.

Family Eulophidæ.

Subfamily Entedoninæ.

Tribe Omphalini.

Genus *Astichus* Foerster.

1. *Astichus bimaculatipennis*, new species.

Normal position.

Female.—Length, 1.85 mm. Funicle not ringed with white, scutellum not smooth, and without grooved lines, parapsidal furrows not very distinct, cilia of wings not in rows, dense; wings with two maculæ. Species large for the genus.

General colour metallic green, the head and pronotum metallic bluish, the face æneous just dorsad, purplish just ventrad, of the insertion of the antennæ; the dorsum of the abdomen, except the metallic green proximal segment, dark, purplish black; metanotum with æneous reflections; scape pallid dusky; thoracic pleura and coxæ metallic dark bluish, the femora

the same, pallid at apical end; trochanters dark; tibiæ and tarsi pallid, the apical tarsal joint dark or black; flagellum dusky; ventum of thorax and abdomen dark, purplish black. Tegulæ dark. Wings hyaline, venation dusky, the fore wing with two dusky blotches along the cephalic or costal margin, the first or proximal one at the junction of the submarginal and marginal veins, rounded and about one-half the size of the apical one, which is situated at the stigmal vein, and is more irregular in outline. Eyes chestnut red; ocelli ruby red.

Head flat from lateral aspect, the occipital margin acute; front broad, concave, vertex narrow, broader laterad; eyes lateral, oval, covering a little over a half of the lateral aspect of the head, the malar space present; antennæ inserted, about on an imaginary line drawn between the ventral ends of the eyes, the scape not reaching to the vertex; lateral ocelli on the narrow vertex at the occipital margin, distant from the eyes, but farther apart from each other than each is from the eye margin, dorsal, an imaginary line connecting them convex; the cephalic ocellus barely visible from dorsal aspect, cephalic, forming a flat triangle with the others, and situated in the cephalic aspect of the vertex front, against the acute occipital margin at the meson and closer to the lateral ocelli than they are to each other. Head delicately shagreened, its surface not as coarse as the surface of the eyes; the entire thorax dorsad moderately, coarsely, polygonally reticulated, the parapsidal furrows mere impressions, inconspicuous, not well defined grooves, and from some aspects seen only caudad; pronotum visible from dorsal aspect, about one-third the length of the mesocutum, the caudal margin of the latter, between the advanced axillæ, convex; scutellum rounded, normal, convex, without grooved lines; mesopostscutellum not large, crescentic, sculptured like the scutellum; metathoracic spiracle margined, distinct, short and broadly oval; metathorax slightly more delicately sculptured than the scutellum and scutum of the mesothorax, and with a delicate median carina, and two others, on each side of the meson, both curved and running caudo-laterad from the caudal margin of the mesopostscutellum; of these two lateral carinæ, the more laterad or cephalic one is the shorter. Coxæ and the thoracic pleura sculptured similarly to the metanotum, the cephalic coxæ less so; caudal coxæ enlarged, subtriquetrous. Abdomen conic-ovate, but very slightly produced or convex ventrad, longer than the head and thorax combined and than the wings; very delicately reticulated.

Fore and hind wings densely ciliate discally, the cilia short and close; marginal cilia of both wings short and close, longer on the hind wings. Marginal vein of fore wings subequal to or slightly shorter than the submarginal vein, the postmarginal vein equal to half the length of the marginal, and nearly twice the length of the stigmal vein, which is bifurcate at apex.

Antennæ filiform, not very long, the scape cylindrical and of moderate length, the funicle 4-jointed, the club 3-jointed, and with a single ring-joint. Pedicel small, obconic, about a third of the length of the long first funicle joint; ring-joint minute; first funicle joint cylindrical, the longest antennal joint, wider than the pedicel and a fourth longer than the following joint; funicle joints 2 and 3 subequal, cylindrical oval, joint 2 slightly longer and slightly narrower than joint 3, and both distinctly shorter and broader than joint 1 of the funicle; funicle joint 4 subquadrate, of about the same width, but only about two-thirds of the length of joint 3; proximal club joint large, half the length of the club, but distinctly smaller than the apical funicle joint; the intermediate club joint smaller, conical, not much larger than the pedicel, about a little over half the size of the proximal club joint; the apical or discal joint minute, nipple- or spur-like. Funicle and club hispid, with white hairs, of which there are about three transverse rows on the first funicle joint, and two rows on each of the following funicle joints and the proximal club joint.

(From a single specimen, $\frac{2}{3}$ -inch objective, 2-inch optic, Bausch and Lomb.)

Male.—Unknown.

Described from a single female specimen received for identification from Mr. R. L. Webster, Iowa College of Agriculture and Mechanic Arts, Ames, Iowa, who reared it as a probable hyperparasite of *Aleris minuta* Robinson. (Bull. No. 102, Iowa State College of Agriculture and Mechanic Arts Experiment Station, Ames, Iowa, p. 210.)

Habitat.—United States, Ames, Iowa.

Type.—Accession No 40,290, Illinois State Laboratory of Natural History, Urbana, one female on a tag, plus one balsam slide with antennæ.

Subfamily Aphelininæ.

Tribe Aphelinini.

Genus *Physcus* Howard.

1. *Physcus varicornis* Howard.

I desire to record the occurrence of this coccid parasite in some Canadian localities. Dr. Hewitt recently sent me four female specimens on slides labelled "From spruce budworm material, Maniwaki, Montcalm and St. Gabriel de Brandon, Province of Quebec, 2, 3 and 6, July, 1911."

In the original description of this genus (Howard, Bull. No. 1, technical series, Division of Entomology, U. S. Department of Agriculture, 1895, p. 43), a statement is made to the effect that the "second and third funicle joints" are "subequal and each longer than joint 1." Later (Id., Bull. No. 12, technical series, Bureau of Entomology, U. S. Department of Agriculture, 1907, p. 72), this statement is used as a diagnostic character in a table of genera to the Aphelinini. The character varies. In the four specimens noted above, three have the joint as described, but the fourth specimen has the first funicle joint slightly longer than either joint 2 or 3. In some Illinois specimens I have noted the same variation, sometimes all three joints equal, sometimes the second shortest, and in others as described originally. The matter is of no great importance, since the table mentioned can do without the line containing the statement about the funicle joints. The variation itself, however, is a rather peculiar one, and important from the standpoint of specific characters.

Genus *Prospaltella* Ashmead.

1. *Prospaltella aurantii* (Howard).

This widely distributed parasite of coccids has lately been received from Dr. Hewitt from several localities in Canada, which I think should be recorded in this connection. There were seven females on six slides labelled "From spruce budworm material, Chicoutimi, St. Gabriel de Brandon and Maniwaki, Province of Quebec, July 2 and 3, 1911." They evidently originated from some coccid concealed in the host material. All of the specimens were compared with the type, and are homotypes, therefore. The fore wings in this species seem to have a tendency to be very slightly clouded out to the end of the marginal vein from base, but this cloudiness is so slight that one cannot always be sure that it is real. From the collections of the United States Department of Agriculture I have a series of six females on a slide, with a number of other coccid parasites labelled "1725. *Aspidiotus* on common wild shrub on streams, California and Cuautla, Morelos, Mexico, July 1, '97, Koebele."

I have also seen two other series of this species from Mexico, on slides from the same collection, which evidently form a distinct race of *aurantii*, and which I thought at first would certainly prove to be specifically distinct. This form differs in having distinctly broader fore wings (about from 19 to 21 lines across the widest portion of the blade, *aurantii* bearing only about 15), their longest marginal cilia less than a third of the greatest width (in the type form over a third), and the antennæ differing in that each joint of the funicle is longer than the one preceding, the third longest; whereas in the type form the second joint is longest. I have no doubt but that these forms grade into each other. The specimens should be recorded. They are: Three females on a slide with *Signiphora* labelled "1745. *Aspidiotus* on soft wooded fibrous tree. Cordoba, Mexico, 17, 7, '97, Koebele"; and thirteen females on a single slide, with several species of *Signiphora* (*mexicana* Ashmead, *flavopalliata* Ashmead, and *townsendi* Ashmead), together with an *Ablerus*, labelled "1768. *Aspidiotus* on Hibiscus, Cuautla, Morelos, Mexico, May 29, '97, Koebele." These last specimens varied in colour, most of them having the abdomen wholly black-brown instead of brownish yellow.

FURTHER NOTES ON DIABROTICA.

No. II.

BY FRED. C. BOWDITCH, BROOKLINE, MASS.

(Continued from Vol. XLIII, page 417.)

D. boucardi, nov. sp.

Head, thorax and scutel smooth shining black; antennæ and feet fuscous yellow; elytra bright purple, lateral margin obsoletely viridescent, with two transverse depressions and also humeral and lateral submedian impressions. Length 7 mm.

One example, Panama, in the Boucard collection of the Tring material; Belongs in sec. D, near *coccinea* Baly. The palpi are the colour of the antennæ; head with a deep frontal puncture; antennæ more than half as long as body, 2nd joint short, 4 much longer than 3. Thorax elongate, sinuate and sharply angled behind with a deep transverse depression, occupying the rear half; elytra somewhat dilated at the rear; the 1st transverse impression is at the rear of the anterior third, the 2nd is much the larger of the two and occupies the middle of the elytra, the two connected by a depression along the suture; the humeral depression is slightly curved inwards and ends about the beginning of the middle third

the lateral depression is broad and submedian. The depressions give a much swollen or torous effect to the rear of the elytra. The relative length of the antennal joints might place this form in sec. 1, but the general appearance is such that I have put it next *coccinea* Baly; the elytra are sparsely diffusely punctulate, body beneath black.

D. tæniolescens, nov. sp.

Head and thorax rufous yellow; antennæ and legs yellow; scutel dark rufous; elytra pale yellow, each with 4 elongate black spots, a humeral and subbasal median, and two behind the middle, in the rear of the anterior ones, giving the appearance of 2 interrupted black vittæ, body beneath black. Length, 5 mm.

One example, Callanga, Peru.

A very well marked form coming next to *tæniolata* Gahan, from which it differs in the wholly flavous antennæ and spotted in place of vittate elytra. The thorax is finely punctulate and has a deep oblique fovea on each side and a third round one at the rear; the punctures of the elytra are moderate and arranged in obsolete striæ; the subbasal spots do not attain the margin and are a little short of $\frac{1}{3}$ the length of the elytra; the two rear spots end just over the convexity; the exterior angles of all the spots are rounded; the general appearance on each side of the rear spots on each elytron, is that of an oblong black patch bisected by a narrow yellow stripe.

D. 4-signata, nov. sp. (Jac. in litt.).

Head black; antennæ black, extreme base and joints 8-11 flavous, except extreme tip of 11 and base of 8 which are black. Thorax flavous-rufous, wider than long, smooth, obsoletely trifoveate; elytra flavous, rather coarsely and thickly punctate, each side with 5 short viridicyaneous streaks, a basal median, a humeral, a lateral and two small postmedian spots, placed on the convexity longitudinally behind the first two anterior streaks. Body below and legs testaceous, tibiæ and tarsi fuscous. Length, 6 mm.

Two examples, Marcapata, Peru.

Very close apparently to *humeralis* Gahan. The antennæ, however, seem to differ and the markings are viridicyaneous in place of nigrocyaneous. The species has been distributed with the manuscript name *4-signata* Jac. and two co-types have been sent me by Messrs. Staudinger & Bang-Haas. In my two examples the inner basal marks are not joined to

the outer as in *humeralis*, but I have one or two examples which are puzzling to place in either species, and I feel a little doubtful as to the specific limits of either form.

The antennæ are a little more than half as long as the body, the basal joints piceous below, the punctures of the elytra are fairly well arranged in striæ on the disk and obsoletely biseriata.

D. subangulata, nov. sp. (Jac. in litt.).

Head black with a large triangular fovea; antennæ three-fourths the length of the body, black, with the four or five basal joints fuscous and the three last (extreme tip of the eleventh excepted) white. Thorax transverse, rufous, depressed, bifoveate (third obsolete); scutellum black; elytra moderately coarsely punctate, black, a large oblong basilar spot, a median transverse fascia, not attaining either the margin or suture, and a large quadrate apical spot in each elytron, whitish flavous. Legs yellow with black or piceous tibiae and tarsi. Body below yellow with breast black. Length, 8 mm.

Seven examples, Marcapata, Peru.

Very variable in the light elytral marking, as noted hereafter. The third joint of the antennæ is $\frac{1}{2}$ longer than the second, the fourth shorter than the preceding two, the colour of the basal joints varies somewhat in the amount of black, some being much darker than others; the thorax is much broader than long, with a few fine punctures scattered over the surface; the two side fovea are distinct and the third just before the scutellum is obsolete; the sides are widely depressed and moderately sinuate, the surface dull shining; elytra are moderately dilated behind, only slightly depressed behind the scutellum. What I consider the typical light spot marking varies at the base so that the basal spot and median fascia may unite and the black band between becomes a curved lunule from the shoulder, running towards, but not reaching, the suture; also the apical spot may unite with the median fascia, leaving the band between as a more or less well defined spot. In one example the spots are so suffused as to indicate that specimens occur which are wholly light flavous, except the margins. The colour of the tibiae and tarsi seem to vary from black to light piceous according to the predominance of the black markings of the elytra.

This species has been distributed with the manuscript name *subangulata* Jac. I have received 4 co-types from Messrs. Staudinger & Bang-Haas.

D. inconspicua, nov. sp. (Jac. in litt.).

Entirely pallid testaceous, with black eyes; antennæ fuscous in the middle, mandibles dark. Head with a deep frontal fovea, antennæ nearly three-fourths as long as body, 3rd joint nearly as long as 4. Thorax nearly as broad as long, strongly obliquely bifoveate and somewhat depressed behind; elytra slightly dilated to the rear, a faint piceous spot on the shoulder, and with punctures thick, moderate and obsoletely arranged in rows. Length, 6 mm.

Two examples, Callanga, Peru.

This species has been distributed with the manuscript name *inconspicua* Jac. My two examples were sent me as co-types by Messrs. Staudinger & Bang-Haas. The species is analogous to many in the latter part of sec. 1. The elytra are not plicate.

D. guyanensis, nov. sp.

Head shining black; mouth parts flavous; antennæ piceous at base, fuscous in middle, last four joints flavous, extreme tip of 11 dark. Thorax rufous, shining, lightly bifoveate, depressed; scutellum black; elytra strongly plicate, flavous, with a short common sutural and a long humeral stripe black; punctation thick and subrugose. Body below flavous, breast black, legs flavous.

Var. with short submedian, subsutural black stripe or spot.

Three examples, Br. Guiana type form, 1 var. do., and 1 Pachitea, Peru. Length, 6-6½ mm.

The antennæ are long and slim, reaching nearly three-fourths the length of the body; the thorax is very slightly sinuate behind, rounded in front, almost square, and noticeably polished; the sutural stripe is of medium width, a little less than one-third the length of the elytra, hardly narrowed behind; the humeral stripe stops just round the bend of the convexity, and is evidently sometimes interrupted at a little behind the middle. Both stripes attain the base. This species resembles the forms in sec. 1, division O.

D. bertonii, nov. sp.

Head rufous; labrum and spots on the vertex piceous; antennæ black, joints 8-9 flavous with bases and tips dark. Thorax rufous, rather

coarsely punctate, deeply trifoveate; scutellum piceous rufous; elytra thickly punctate, shining black, the margins, the suture (very narrowly behind) and a median band dilated at the sides and suture, flavous; beneath, thorax red, body black, legs flavous with tibiae and tarsi and apex of femora above, and coxae black. Length, 6 mm.

Type 1 example, Puerto Bertoni Alto Parana, Paraguay, sent me by Mr. Schrotky, also a specimen in the Jacoby collection labelled "1 A.A. 28 In Ocynis."

Should be placed near *borrei* Baly, but the punctuation and flavous markings very different; the thorax is much broader than long, slightly sinuate behind. the fovea connected by a well marked sulcus; the punctuation of the elytra is rather coarse and thick, becoming obsolete behind; the black spots do not attain the basal margin (as in *borrei*) and there is a well marked sulcus on the sutural side of the shoulder; and the elytra are very obsoletely shortly plicate; the sutural yellow stripe is narrowed behind to a mere line just separating the black spots on the elytra; all the spots have the angles rounded.

D. thammii, nov. sp.

Head and thorax rufous; antennae fuscous, tip of last joint dark. Thorax wider than long, trifoveate, the lateral ones oblique and deep; scutellum rufous or piceous; elytra thickly punctate, dull shiny black, the lateral margin slightly dilated at the apex and a median transverse fascia more or less dilated up and down the suture, flavous. Beneath, thorax red, body black, legs yellow, tarsi more or less piceous. Length, 5-5½ mm.

Type, Marcapata, Peru, in 2nd Jacoby collection; also Pachitea, Peru; single example in the 1st Jacoby collection, Chanchomayo, Peru (Thamm) labelled "*concula* Er. ♀?" Twelve examples in all.

Very like *bertonii* supra and near *borrei* Baly. The antennae ♂ are $\frac{3}{4}$ as long as body, joint 3 and 4 nearly equal; the thorax is broadly margined and slightly sinuate behind and the surface is sparsely evidently punctate. The black of the elytra varies considerably; in what I consider typical there is a solid basilar fascia; but specimens occur where the fascia is divided into two distinct rounded subbasal spots, leaving a wide sutural yellow stripe and a narrow basilar stripe, flavous, all the flavous marks connected. In this form also the rear fascia is narrowly subdivided by the narrow yellow suture. The elytra are shortly obsoletely plicate.

NEW SPECIES AND GENERA OF NORTH AMERICAN
LEPIDOPTERA.

BY WM. BARNES, M.D., AND J. MCDUNNOUGH, PH.D., DECATUR, ILL.

*Family Noctuidæ.**Heliothis ætheria*, sp. nov.

Head and thorax clothed with olivaceous hairs ; primaries dark olive green, in most cases entirely suffused with rich purplish as far as the subterminal line ; a blue spot on costa near base, often extending along costa to t. a. line ; this latter pale blue, rather broad, strongly and evenly convex ; t. p. line narrower, slightly defined by blue, especially on costal and inner margins, perpendicular to costa and well beyond reniform to a point opposite base of same, then strongly incurved to below reniform and again straight to inner margin ; median area largely filled with pale yellowish, leaving a narrow costal border and a larger patch on inner margin of the ground colour, and containing a large dark quadrate reniform more or less scaled with purplish, the upper portion of which tends to suffuse with costal border ; s. t. line marked by the difference in shade between the purplish subterminal area and the narrow olive terminal portion, slightly waved, on the whole parallel to outer margin ; fringes concolorous. Secondaries black, with an irregular pale yellow median band not reaching inner margin, and much constricted in central portion, or even broken into two spots ; fringes whitish. Beneath, primaries black, with a broad, sharply defined pale yellow median band containing a large black discal spot corresponding to reniform, terminal area at costa suffused with whitish ; secondaries as above, but costal area pale yellowish and median band broader, entirely enclosing black discal spot ; costal half of terminal area suffused with whitish ; fringes pale, darker at apex of primaries. Expanse, 25 mm.

Habitat : Redington, Ariz, 10 ♂s, 14 ♀s. Types, collection Barnes.

The species is closely related to *sueta* Grt., which, however, lacks the blue shading of the Arizona form ; the ground colour is quite variable, at times all traces of the pink suffusion being lost.

Schinia velutina, sp. nov.

Head, thorax, abdomen and wings white, very slightly suffused with a pale ochreous. At first glance apparently immaculate, by holding in certain lights the maculation of primaries is distinctly visible as satiny white lines ; t. a. line strongly outwardly oblique to just below cubital

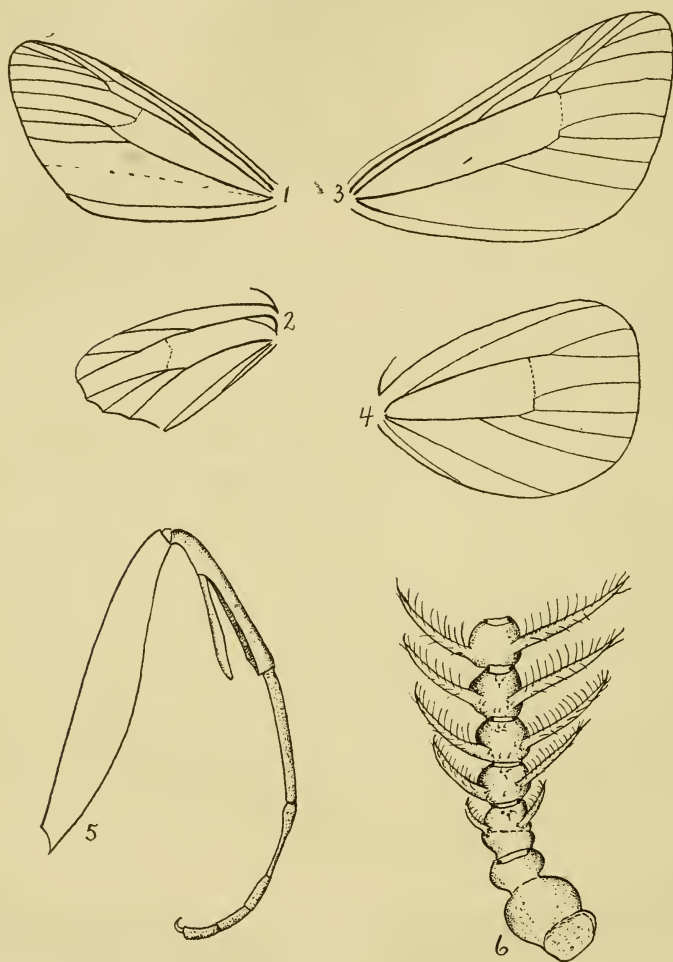


FIG. 1.—Generic features of *Grossbeckia* and *Friesia*.

1. Venation of fore wing of *Grossbeckia semimaculata*.
2. " of hind wing of " "
3. " of fore wing of *Friesia anormalis*.
4. " of hind wing of " "
5. Fore leg of *Friesia anormalis*.
6. Basal portions of antennae of *Friesia anormalis* (much enlarged).

vein, then just as strongly oblique inwardly to inner margin; reniform indistinctly visible as a satiny white patch; t. p. line well excurved around reniform, thence parallel to outer margin to a point on inner margin a little more than two-thirds from base; s. t. line rather indistinct, slightly waved, approached to t. p. line on vein Cu_2 . Secondaries immaculate; all fringes white. Beneath, white, with a very prominent discocellular dusky spot on primaries. Expanse, 25 mm.

Habitat: Eureka, Ut. (Spalding), 2 ♂s. Type, collection Barnes.

The fore tibiae possess one long curved claw on inner side, and a small claw with strong spine above it on outer side.

Grotella parvipuncta, sp. nov.

Head, thorax and primaries creamy white, latter with only faint traces of black dots, consisting of one in the median fold near base of wing, an oblique postmedian row of three parallel to outer margin, the upper just above the origin of vein 5, the second in submedian fold below vein 2, and the third on inner margin; occasionally a trace of a second dot on inner margin about two-fifths from base. Primaries smoky brown, with pale fringes, darker in ♀ than in ♂. Beneath, primaries deep smoky, with ochreous costal margin and pale fringes; secondaries whitish, at times slightly smoky, immaculate. Expanse, 23 mm.

Habitat: Ft. Wingate, N. M.; Deming, N. M., 2 ♂s, 3 ♀. Types, collection Barnes.

The species is close to *dis* Grt., which it resembles in the almost obsolete maculation; it is, however, slightly smaller, the primaries are creamy white and not chalky white as in *dis*, the secondaries are paler brown on upper side, and lack the faint median band and discal dot on under side, which is present in seven specimens of the true *dis* examined by us. It is probably confused with this species in collections, but we have recently had specimens compared with the type of *dis* in the Snow collection by Mr. F. X. Williams, and he agrees with us that the two species are distinct. Hampson's figure of *dis* probably represents that species.

Grotella soror, sp. nov.

Head and thorax white, abdomen ochreous brown; primaries very pale ochreous, white along inner margin; two brown spots on costa in basal third, the outer one larger and oblique, forming the commencement of a broken antemedial line, the continuation of which is formed by a perpendicular brown dash between cubital and anal veins, and a dot on inner

margin about two-fifths from base of wing; a diffuse brown spot just beyond the middle of costa and a faint dot at end of cell; a subterminal line of brown dots, very evenly outcurved to submedian fold, terminating in a straight dash, perpendicular to inner margin but not quite attaining same; a large apical brown blotch, between which and subterminal line are two small brown dashes, placed vertically, the upper resting on costa; two terminal black patches at extremity of veins 2 and 3; fringes broadly checkered with dark brown; outer margin pale. Secondaries whitish, largely suffused with smoky, and with a broad dark brown marginal band, narrowing towards anal angle; a faint discal dot and pale fringes. Beneath, primaries smoky brown, fringes checkered; secondaries as above.

Habitat: Redington, Ariz., 1 ♀. Type, collection Barnes.

Closely related to *binda* Barnes; differs in the more even subterminal line, the presence of an apical brown patch, and patches at termination of veins 2 and 3, and the fact that the brown checkering of the fringes does *not* extend backward on the terminal area of the wing itself as in *binda*; the secondaries are darker, with more distinct marginal band.

Eriopyga dubia, sp. nov.

Palpi with the third joint longer and less porrect than is generally the case in this genus; head and thorax gray; primaries dark gray, very suffused and slightly shiny in appearance, and with all the maculation indistinct; t. a. line black, single, inclined outwardly, lunulate, preceded by a pale shade; basal area before t. a. line largely suffused with blackish shading; t. p. line excurved around cell, then parallel to outer margin, single, black, crenulate, mostly very indistinct; orbicular a pale, oval, indistinct mark, situated near t. a. line; reniform a black shade more or less hidden by the dark median shade, which is angled slightly below same; s. t. line not recognizable; a terminal black line broken by yellow dots at termination of veins; fringes concolorous. Secondaries smoky; fringes with an ochreous basal line, followed by dark line, beyond which the fringes are lighter. Beneath smoky, with an indistinct postmedian line and discal dot to both wings. Expanse, 20-25 mm.

Habitat: Redington, Palmerlee, Ariz., 10 ♂s, 1 ♀. Types, collection Barnes.

The antennæ in both sexes are ciliate, and the species is quite delicate, more like a *Cerma* species in general appearance; the hairy eyes would preclude this association, however. Considerable variation in size exists in the specimens before us.

Eriopyga antennata, sp. nov.

Antennæ of ♂ very strongly bipectinate ; of ♀ slightly ciliate ; head and thorax clothed with a mixture of gray and red-brown hair and scales ; primaries deep brown or purple-brown, the distinctness of the maculation variable ; basal line slightly marked on costa ; t. a. line geminate, black, filled with a pale shade of the ground colour, inner line indistinct, slightly outwardly oblique, with an outcurve in submedian fold and another below vein 1 ; orbicular when present small, round, outlined in dark, filled with ground colour ; reniform indistinctly outlined, outer portion filled with yellow above, which is a single white dot and below it two, remainder filled with ground colour ; no trace of claviform ; t. p. line indistinct, geminate, the outer line being reduced to a series of venular dots, well exerted around cell and slightly incurved in submedian fold ; median shade very faint ; subterminal space slightly paler than rest of wings ; s. t. line pale yellow, rather broken, defined by a dark preceding shade, angled outwardly below apex of wing, incurved slightly opposite cell and in submedian fold ; a very faint black broken terminal line and an ochreous line at base of the dark fringes. Secondaries whitish, hyaline, strongly suffused with smoky in all but the basal portion ; with small discal dot. Beneath, primaries smoky, sprinkled outwardly with ochreous, with small discal dot and traces of a postmedian line on costa ; secondaries whitish, sprinkled along costa and outer margin with ochreous, a small discal dot and broken postmedian line ; a faint broken dark terminal line to both wings. Expanse, ♂ 25 mm. ; ♀ 28 mm.

Habitat : Redington, Ariz., 4 ♂ s, 3 ♀ . Types, collection Barnes.

A variable species. The markings of the reniform tend to obsolence, and only to well marked specimens is the above description applicable ; sometimes the white dots are absent, in other specimens the yellow patch is greatly reduced as well, but a careful examination will usually show sufficient of the typical maculation to avoid confusion with other species. The male antennæ are more strongly pectinate than in other species we have seen.

Eriopyga gigantoides, sp. nov.

♀.—Palpi outwardly black-brown, a few ochreous hairs at tip of second joint ; front with a strong tuft of dark-brown hairs sprinkled with ochreous ones ; tegulæ and thorax rather lighter brown ; primaries purplish-brown, rather shiny, the basal portion of wing to t. a. line sometimes shaded considerably with blackish ; in such specimens the basal line is not visible ; in lighter forms it may be distinguished as a geminate

black mark on costa; t. a. line black, geminate, the outer line most distinct, filled with the ground colour, slightly outwardly oblique and rather evenly crenulate; orbicular and reniform obsolete; t. p. line black, geminate, crenulate, the inner line only distinct, filled with rather paler shade than the ground colour, strongly outcurved just below costa, then parallel to outer margin, forming an outward angle on anal vein; a strong black median shade, the most prominent feature of the maculation, extends obliquely outwards from costa to below position of reniform and close to t. p. line, where it is sharply angled; its course is then sinuate to middle of inner margin; s. t. line indistinct, at times almost wanting, pale, angled below apex of wing, then rather evenly sinuate and close to outer margin; a terminal series of black dots; fringes dusky, with ochreous basal line. Secondaries smoky, with incomplete dark terminal line; fringes somewhat lighter, with ochreous basal line. Beneath, primaries smoky, shaded with ochreous along costa and outer margin, with a rather rigid dark postmedian line, slightly curved at costa, a slight discal mark, and prominent terminal row of dark dots; secondaries shiny whitish, sprinkled in costal half with ochreous and black; a dark discal spot, crenulate postmedial line, indistinct towards inner margin, and terminal row of dots. Expanse, 32 mm.

Habitat: White Mts., Ariz., 3 ♀s. Type, collection Barnes.

Allied to *gigas* Sm., of which we possess co-types; differs in the much smoother and darker appearance, the narrower wings, and the lack of orbicular and reniform.

(To be continued.)

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The forty-eighth annual meeting of the Entomological Society of Ontario was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, Nov. 23rd and 24th. During the day meetings the chair was occupied by the president, Dr. E. M. Walker, and during the evening meeting by President Creelman, of the college.

Among those present were Messrs. H. H. Lyman and A. F. Winn, Montreal; Dr. C. Gordon Hewitt and Mr. Arthur Gibson, Ottawa; Prof. J. M. Swaine, Macdonald College, St. Anne's, P.Q.; Mr. J. D. Evans, Trenton; Dr. E. M. Walker and Mr. J. B. Williams, Toronto; President Creelman, Professors Bethune, Zavitz, Jarvis, Hutt, Howitt, Messrs. Pettit, Cæsar, McCubbin and Baker, of the staff, and a number of students of the Ontario Agricultural College and Macdonald Institute.

On Thursday morning a meeting of the Council was held, at which the report of the proceedings of the Society during the past year was drawn up and various matters of interest to its members were discussed. In acceptance of an invitation from Dr. Hewitt, it was decided to hold the next annual meeting at the Central Experimental Farm, Ottawa, the exact date to be decided upon later. Prof. J. H. Comstock of Cornell University, and Dr. E. P. Felt, State Entomologist of New York, were elected Honorary Members of the Society. Mr. E. Baynes Reed, Meteorological Station, Victoria, B. C., was elected a Life Member.

In the afternoon the proceedings commenced with the reading of the reports of the following directors on the insects of the year in their respective districts: Mr. A. Gibson, Ottawa; Mr. C. E. Grant, Orillia; Mr. A. Cosens, Toronto, and Mr. R. C. Treherne, Grimsby. Dr. Hewitt then gave an account of the work of the Division of Entomology, which showed that, with a much increased and most efficient staff, gratifying progress was being made along many lines of entomological work, particularly in the establishment of field stations in various parts of the country, in the campaign against the Brown-tail Moth and in the study of the parasites of the Larch Saw-fly and Spruce Bud-worm. Mr. Cæsar then read an extended and valuable paper on the insects of the year in Ontario, which was discussed at considerable length by many of those present. This was followed by a paper by Dr. Fyles, "Notes on the Season of 1911," after which the reports of the Montreal and Toronto branches and of the Treasurer, Curator and Librarian of the Society were read and adopted.

In the evening a public meeting was held in the Massey Hall Auditorium, which, considering the inclemency of the weather, was fairly well attended by students of the college and visitors from the town, as well as by members of the Society.

President Creelman, who occupied the chair, opened the meeting with a short address of welcome in his usual cordial manner. Dr. William Riley, of Cornell University, who was to have been the speaker of the evening, was unfortunately prevented by illness from being present, but his place was ably filled by Dr. Hewitt, whose address on "Insect Scourges of Mankind" was listened to with great interest and attention by those present. He gave a very thorough account of various diseases, the germs of which are carried from one patient to another through the agency of insects, dwelling especially upon the Sleeping Sickness and other tropical diseases caused by trypanosomes and transmitted by Tse-tse flies, and on

malaria and yellow fever, which are transmitted only by particular species of mosquitoes. The address was illustrated by many excellent lantern slides.

On the following morning the members spent a pleasant hour in the Biological Museum, where many interesting specimens were exhibited by those present. At 10.30 o'clock the proceedings were resumed in the Biological Lecture Hall, the president, Dr. E. M. Walker, opening the meeting with the reading of the presidential address, which dealt with the entomological field in Canada at the present time and the directions along which progress in this science may be expected in the near future.

In the afternoon the following papers were read: "Some Forest Insects from De Grassi Point, Lake Simcoe," by Dr. Walker; "Thrips Affecting Cereals," by Dr. Hewitt; "The Stream," by Dr. Fyles; "Blister Beetles," by Mr. Arthur Gibson; "A Parasite of *Hepialus Thule*," by Mr. A. F. Winn; "Common Ipidæ of Eastern Canada," by Prof. J. M. Swaine; "Insect Migrations in Manitoba," by Mr. Norman Criddle; "The Catalogue of Canadian Insects," by Dr. Hewitt; "Entomological Record for 1911," by Mr. Gibson; and "Notes on *Hepialus hyperboreus*," by Mr. Horace Dawson.

The election of officers for the ensuing year resulted as follows:

President—Dr. Edmund M. Walker, Lecturer in Zoology, University of Toronto.

Vice-President—Dr. C. Gordon Hewitt, Dominion Entomologist, Central Experimental Farm, Ottawa.

Secretary-Treasurer—Mr. A. W. Baker, B. S. A., Demonstrator in Entomology, O. A. College, Guelph.

Curator—Mr. Lawson Cæsar, B. A., B. S. A., Lecturer in Entomology and Plant Diseases, O. A. College.

Librarian—Rev. C. J. S. Bethune, M. A., D. C. L., F. R. S. C., Professor of Entomology and Zoology, O. A. College.

Directors—Division No. 1, Mr. Arthur Gibson, Div. of Entomology, Central Experimental Farm, Ottawa; Division No. 2, Mr. C. E. Grant, Orillia; Division No. 3, Mr. A. Cosens, Parkdale Collegiate Institute, Toronto; Division No. 4, Mr. C. W. Nash, East Toronto; Division No. 5, Mr. R. S. Duncan, Port Hope; Division No. 6, Mr. R. S. Hamilton, Collegiate Institute, Galt; Division No. 7, Mr. W. A. Ross, Jordan Harbour.

Delegate to the Royal Society—Prof. J. M. Swaine, Macdonald College, P. Q.

Auditors—Prof. J. E. Hewitt and Mr. W. A. McCubbin, Ontario Agricultural College.

NOTES ON THE LIFEHISTORY OF *NEPTICULA SLINGERLANDELLA* KEARFOTT (TINEIDÆ).

BY C. R. CROSBY, ITHACA, N. Y.

The following notes on the life history of the plum leaf-miner are compiled from the notes of the late Professor M. Slingerland, supplemented by observations by the writer :—

The plum leaf-miner is a new fruit pest which was brought to Professor Slingerland's attention in the fall of 1907 by C. M. Hooker & Sons, of Rochester, N. Y., who stated that it had been present in their plum and prune orchards for a number of years and had been gradually increasing in numbers. The mines were so abundant that the trees were partially defoliated and the size and quality of the crop injured.

We have not been able to find this miner in other orchards, and with the possible exception of apple no other food plant is known. That it may occasionally attack apple is quite probable. While examining some old apple trees in a neglected orchard, about a quarter of a mile from the Hooker orchard, on July 7, 1911, the writer found that mines very closely resembling those of the plum leaf-miner were abundant in the leaves of the water sprouts growing at the base of several trees. Infested leaves were brought to the insectary, but the larvæ left the mines while in transit and constructed cocoons indistinguishable from those of the plum leaf-miner. The identity of this apple leaf-miner cannot be settled definitely until the moths are reared next spring.

In the Hooker orchard the plum leaf-miner has shown a decided preference for certain varieties. German and Italian prunes are most severely infested; French and Shropshire Damsons are less subject to attack, although some years ago the former variety was badly infested; Diamond, Bradshaw, Lombard and Rheinclaude are nearly immune.

LIFE HISTORY.

The moth.—The adult of the plum leaf-miner is a small bronzy black moth having an expanse of $1/7$ to $1/5$ inch. The fore wings are crossed by a shining white band on the outer third and the head bears a conspicuous orange tuft. These moths emerge from cocoons at or near the surface of the ground during the daytime in the latter part of May and in early June. During the day they remain quietly on the bark of the trunk and larger branches, none being found on the leaves. Several hundred moths are often found on a single tree; when disturbed they suddenly take flight and most of them settle on the opposite side of the tree. They gradually decrease in numbers and about the middle of June disappear.

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The egg.—The act of egg-laying has not been observed, but probably takes place in the evening or at night as the moths are rarely seen on the leaves during the day. The eggs are attached to the under surface of the leaf, usually at the forks of the more prominent veins. The egg is about .3 mm. long by .2 mm. wide, oval in outline, flattened where attached to the leaf and dome-shaped in profile. The green of the leaf shows through the transparent egg-shell, making it a difficult object to find. They are most easily located by holding a leaf at an angle in the sun so the light will strike it obliquely when the eggs will be seen as minute glistening dots. The exact time required for the hatching of the egg has not been determined, but it cannot be far from two weeks. On June 2, 1908, an examination of the orchard showed that a great number of eggs had been laid; on June 9 no eggs had hatched, and on June 18 hatching had just nicely begun.

The larva.—In hatching the larva eats its way out of the egg-shell on the under side next to the leaf and enters the leaf directly without coming out on the surface. When full grown the larva is about 1/6 inch in length, greenish white in colour, with the head light brown; the contents of the alimentary canal show through the semitransparent body wall as a greenish or brownish stripe. The larva is legless and only slightly flattened; the constrictions between the segments are rather deep but obtuse; the surface of the body is smooth and clothed with dense, very short, microscopic hairs interspersed with a few larger ones.

The mine.—After entering the leaf directly from the under side of the egg the young larva eats out a narrow linear burrow or mine an inch or less in length, leaving the outer layers of the leaf intact. This portion of the mine usually follows a tortuous course but may be nearly straight. The larva next enlarges its mine into an irregular ovate blotch about one-half inch in length. In the linear portion of the mine the excrement is left as a blackish streak extending along the centre of the burrow; in the blotch mine it forms a broad irregular band along the centre, but does not extend to the tip. The outer leaf layers overlying the mines turn brownish or yellowish; the upper layer seems to be thinner than the lower and the mines are more conspicuous when viewed from above. There are ten or a dozen mines in a single leaf.

The cocoon.—When full grown the larva leaves the mine through a cut in the upper surface of the leaf, falls to the ground and there constructs a small flattened brownish cocoon in cracks in the soil, under

loose stones, or between the base of the tree and the surrounding soil. When the ground is undisturbed they are rarely found more than an inch below the surface. Sod furnishes ideal winter quarters for the cocoons. The cocoon is light brownish in colour, broadly oval and moderately arched; it is about $2\frac{1}{2}$ mm. long by $1\frac{1}{2}$ to 2 mm. wide, and is usually slightly wider at one end. It is surrounded by a thin flange formed by the closely united edges of the two valves of which the cocoon is composed. The cocoons are held in place by a few strands of silk. The time at which the larvæ become mature and construct their cocoons varies considerably with the season. On July 6, 1911, about one-half the larvæ had left the mines; on July 21, 1908, and July 19, 1909, a few larvæ were still present in the mines.

The pupa.—After forming the cocoon the larva apparently does not transform at once; a cocoon opened August 4, 1908, contained a larva. The winter, however, is passed in the pupal stage. On October 10, 1911, the writer opened a number of freshly gathered cocoons and found that all the larvæ had transformed to pupæ.

The pupa is about 2 mm. in length, ovate, pointed behind and somewhat flattened. The ventral surface is brownish yellow, the dorsum greenish. The eyes are dark coloured and the orange tuft on the head of the moth shows through the pupal skin. On the dorsum of the abdomen there are six transverse interrupted rows of short brownish spines. On each side of the dorsum there is a longitudinal row of wart-like protuberances, each bearing a colourless spine. The anterior spines are very short and they gradually increase in length towards the tip of the body. When about to transform to the adult the pupa works itself partly out of the end of the cocoon, probably by the aid of these spines. The empty pupa skin is left protruding from the cocoon.

Parasites.—No parasites were observed infesting the plum leaf-miner until May 11, 1911, when a cocoon was found containing the larva of a Chalcis-fly. The larva is 1.4 mm. long, smooth, whitish in colour and rounded at both ends. On June 2, 1911, two adults of the parasite were found in a vial containing cocoons of the moth. They had emerged through a smooth, round hole in the side of the cocoon. In the fall of 1911 the parasites had increased in numbers so that nearly one-half of the cocoons examined were infested. So far only three adults, all males, have been reared. They are small, four-winged flies, metallic green in colour and about $1\frac{1}{2}$ mm. in length. This species has recently been described as *Derostenus salutaris* Crosby.

GEOMETRIDÆ AS YET UNDESCRIBED.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

(Continued from page 253, Vol. XLIII.)

Eupithecia vaporata, n. sp.

Expanse, 13-15 mm. Palpi moderate, rather heavily scaled, dark brown. Antennæ slender, gray, barred faintly with dark brown, shortly ciliate beneath. All above gray, mixed with dusky brown, scaled, the front and first two segments of the abdomen being paler, the latter without tufts. Fore wings narrow, extended at apex, are crossed by a number of ill-defined hair lines composed of the darker scales. The intra- and extradiscal lines appear double and heavier, the former obliterating the discal dot, which it reaches at a sharp angle from costa, and thence with a strongly basal trend to inner margin; the latter, with less of an angle below costa, becomes slightly heavier opposite cell, and wavy to inner margin, nearly parallel to intradiscal. The basal line is obsolete. Beyond extradiscal the usual geminate pale line is present, not clear, but faintly margined outside with a fine hair line of dark scales. These cloud the subterminal space, which is without definite markings. Marginal line broad, black, broken at veins. Fringes rather long, gray. Hind wings with lines as on primaries, but fainter, except at inner margin, the extradiscal being heaviest, with strong outward curve around discal dot, which is a mere pin point. Marginal line and fringes as on primaries. Beneath the body and wings are somewhat paler and more glossy, the lines on wings reproduced as above, and all except the marginal line are fainter.

Types, ♂ and ♀, from San Diego, California (Ricksecker), were taken at light, May 16, 1910, and co-types in a series of fourteen in both sexes, from the same locality, are in author's collection. Also a co-type ♀ from collection of Geo. H. Field, San Diego, Cal., taken by him April 22, 1910, is in possession of Mr. J. A. Grossbeck.

This species is smaller even than *huachuca* Gros., less distinct in markings, and paler in ground colour.

Eupithecia scabrogata, n. sp.

Expanse, 22 mm. Of the same size, and much resembling *subapicatu* Guen. Palpi short, stout, loosely scaled, dark brown. Front and vertex rough, with a mixture of dark and pale brown scales. Antennæ dark brown, flattened, slender, ciliate in ♂, almost bare in ♀. Thorax black centrally, crossed from base to base of wings by a broad dusky white band,

with front and sides dark brown. Abdomen above dark brown, the segments pale ventrally, except the second, which has an irregular black patch above. Beneath generally paler. Ground colour of primaries pale yellowish brown, covered with dark brown and black scales, more thickly massed along costal region, at apex, subterminally at anal angle, and broadly along inner margin below cell to base. This leaves a central patch of yellowish brown, clear of dark scales, from a point at base, broadening out over cell, especially clear about the small, round, black discal dot, thence in an irregular patch, narrowing rapidly, in an upward slant to margin a little below apex. The basal, median and extradiscal are pale geminate cross lines, indicated chiefly at costal and inner margins, the latter a little better defined. The subterminal white line, indicated very faintly, ending in an irregular whitish patch, between veins 2 and 3 at anal angle. Marginal line black, cut with white opposite veins. Fringes long, dusky, having a central dark line, with pale line at base. Veins black-scaled, broken at cross lines, especially beneath cell, and on veins 1 to 4. Secondaries dusky. Inner margin broadly sprinkled with dark scales, cut by the beginnings of pale cross lines, which fade out at centre, the extradiscal pale band being wider and more distinctly outlined. Discal dot very small, dusky. Fringes as on primaries. Beneath dusky, silken, the lines above faintly indicated in dusky dots across wings. Discal dots present on all wings, small, dusky. Thorax beneath and femora darker.

The type, a ♀ from the Hy. Edwards collection, is labeled California, without date, and will rest eventually in the Amer. Museum of Nat. History, N. Y. City, or so soon as the author can obtain a duplicate. The specimen was inadvertently given to him several years ago as *subapicata*. The only other specimen I have seen is a male, submitted to me by Mr. J. A. Grossbeck, from Dr. Barnes' collection, which I have made a co-type. It is labeled Redington, Arizona, also without date, but taken in 1910, and differs only in being rather more strongly and clearly marked than the type. *Subapicata* is taken in December and January, and I doubt not this species appears also about that time.

Genus *Eucymatoge* Hub.

*Eucymatoge penumbra*ta, n. sp.

Expanse, 22 mm. Of same size and shape as *Eup. scabrogata* just described, and might easily be confused with it. Palpi long, moderately

stout, dark brown, almost black. Front covered with an even mixture of dark brown and paler scales, the latter showing more abundantly over vertex, on collar and patagiæ. Antennæ sordid white, ringed with dark brown, simple in both sexes. Above, the ground colour of all wings is a soiled brownish white, overlaid with dark rich brown, mingled with black scales. Thorax above black centrally, has a conspicuous line of pure scales crossing it between wing bases, with front and scutellar region dark brown. Abdomen paler brown, broadly ringed with darker on second segment, without dorsal tufts. The dark brown basal and extradiscal lines cross the primaries, but many hair lines along inner margin in basal and central spaces quickly fade out. The basal composed of three parallel hair lines, the two outer being heavier and black, includes a space, paler than the ground colour, traversed centrally by a fine hair line of brown. It starts from costa one-third out, makes a long sharp angle almost to discal spot, thence backward nearly straight, to inner margin, one-fourth from base. In the male co-type this line is suffused with black scales. The extradiscal two-thirds out runs straight across costa, makes a sharp outward angle below it, and thence nearly parallel to outer margin, slightly waved as it reaches the inner, a little more than two-thirds out. A narrow indistinct geminate pale line borders this outwardly. A pale area occupies the central portion of the wing, with an extension across extradiscal below costa toward apex, and an isolated spot between veins 3 and 4 on subterminal space. The large oblique linear discal spots are rich brown, conspicuous, and are surrounded by a ruddy brown suffusion, which appears again on the apical prolongation, and more faintly on the spot on subterminal space, particularly in the female type. Subterminal space darker, especially opposite cell, where a cluster of black scales starts within extradiscal, extends across it to margin, and upward toward apex. It is traversed centrally by an indistinct volute white line. Terminal line not well marked. Fringes paler than ground colour. Secondaries darkened with brown scales along outer and inner margins, are almost devoid of them centrally and along costa. The geminate pale line and the basal lines are outlined at inner margin, the former traceable nearly to costa. Discal dots round, dark brown. Terminal line black, broken at veins. Fringes pale, cut with black opposite veins. Beneath, all wings pale brownish ashen, darkened apically, the lines as above faintly showing on primaries, and on secondaries, dotted on veins. Discal dots on primaries are large, oblique, linear, black, on secondaries round, black.

Marginal lines black, present on all wings. Fringes paler than above Thorax, abdomen and legs ashen, with dark scales sprinkled heavily on femora and fore legs, and on abdomen toward tip.

The type, a female, has long been a unique in the collection of Mr. W. H. Broadwell, who has kindly allowed me to retain it, and bears the label, Palmerlee, Arizona. The single male co-type is from the collection of Dr. Barnes, submitted to me by Mr. J. A. Grossbeck, and was taken at Redington, Arizona, January 1, 1910.

(To be continued.)

ON *MERRAGATA LACUNIFERA* BERG.

BY J. R. DE LA TORRE BUENO, WHITE PLAINS, NEW YORK.

In 1879, in his "*Hemiptera Argentina*,"¹ Carlos Berg described a new Lygæid genus, *Lipogomphus*, placing it near *geocoris*, which contained a new species, *lacuniferus*,² so called because of the white corial *lacuna* bounded by the thickened brown veins. This was founded on three specimens of an unknown bug taken in Buenos Aires by himself, in company with the Argentine Entomologist, Enrique Lynch. Subsequent study caused him in 1884³ to place his new genus near *Hebrus* Curtis (now sometimes *Næogeus* Laporte). No further reference appears to have been made to this species, except its enumeration by Lethierry and Sévérin,⁴ till 1898, when Champion⁵ referred the genus to *Merragata* Buchanan White, whose type, *Merragata hebroides* F. B. White, is from Mexico.

To my good friend, Rev. Longinos Navas, the learned Spanish Jesuit, I owe the possession of four examples of this very interesting form, which were secured at Montevideo, Uruguay—a second locality for the species. These specimens agree very well with the original description, although, being carded and slightly mutilated, the discrepancy in the number of joints in the hind tarsi, which Champion points out, could not be determined without further mutilating them. The number and proportion of the rostral joints in the individuals before me does not agree with the

1. P. 286.

2. P. 287.

3. Add. et Em. Hem. Arg., pp. 116-117.

4. 1896, Catalogue Général des Hémiptères, III, 52.

5. Biologia Centrali Americana Het. II, 193 (Aug., 1898).

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description, but as in other more easily demonstrable particulars subsequently pointed out, especially in the relative lengths of the antennal segments, there is no material divergence, this is perhaps attributable to an error of observation on the part of the describer. It differs from the Central American species noted by Champion in having the 2nd, 3rd and 4th antennal joints subequal, the first joint being the shortest and stoutest and somewhat curved, and in the bifid scutellar apex, in which last character it resembles the figures of *Hebrus major* Champ. and *H. hirsutus* Champ.⁶ In fact, in regard to the latter species, it would not surprise me at all to find it eventually transferred to *Merragata*, especially since in the unique type the antennæ were broken, but were *assumed* to be five-jointed, a somewhat risky proceeding in view of the fact that the generic difference lies in this character.

Nothing appears to be known as to the habits of the genus. I secured *M. hebroides* B. White in a ditch draining into the Canal de la Viga in Mexico City, in April of 1910, but made no further note than that it was taken by dredging in grasses growing into the water at the edge.

The recognized species of *Merragata* may be separated by the following key, based on Champion's, in the "Biologia Centrali Americana."

1. (2) Scutellum bifid at apex ; antennal joints 2 to 4 subequal, joint 1 shortest, stoutest 1. *Lacunifera* Berg.
2. (1) Scutellum blunt, *not* bifid at apex.
3. (2) Antennal joints 1 to 3 subequal, 4 rather stout and fusiform 2. *hebroides* F. B. White.
4. (3) Antennal joint 3 slender and very much longer than 2 ; 4 slender and subfusiform.
5. (6) Pronotum deeply constricted at the sides. 3 *Leucosticta* Champion.
6. (5) Pronotum moderately constricted 4. *Brevis* Champion.

Næogeus (or *Hebrus*) and *Merragata* look extremely like *Microvelia* in the Gerridæ, but the *apical* tarsal claws at once serve to distinguish them from the last named, in which they are subapical and set in a cleft in the tarsus. The two genera of *Næogeidæ* (= *Hebridæ*) are thus distinguished :

Antennæ 4-jointed *Merragata* F. B. White.
 Antennæ 5-jointed *Næogeus* Laporte (= *Hebrus* Curtis).

6. 1898, Biol. Cent. Am., Het. II, pl. VIII, figs. 1 and 2.

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FURTHER NOTES ON ALBERTA LEPIDOPTERA.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA.

(Continued from Vol. XLIII, page 399.)

278. *Ufeus plicatus* Grt.—I have not seen the type of this species, but what I have as such is the *plicatus* of the British Museum and most other collections that I have seen. It differs principally from what I hold as *satyricus*, probably also correctly, in being redder, having larger wings, with more acute apices, the transverse lines narrower and less diffuse, the t. a. deeply dentate rather than curved. There are other distinctive characters, but these seem the most reliable and most obvious. Of *barometricus* Goosens, I know nothing beyond the mere reference given in Dyar's Catalogue. *Hulstii* Smith was described in Ann. N. Y. Acad. Sci., XVIII, p. 99, Jan., 1908, from two males from Stockton, Utah, and Black Hills, Wyoming. The type is the Stockton specimen, whence I have a pair, the female of which I have compared with it. The description states that it is "perhaps nearest to *satyricus* in type of maculation, but differs obviously in colour, in the absence of all trace of ordinary spots, and in the immaculate under side." In my Stockton male the discoidal spots are practically obsolete, in the female they are very distinctly marked. The under sides are very pale, but not quite immaculate. These obviously merge into my series of Calgary *plicatus*, and if mixed they would be inseparable without the labels. I would suggest that Prof. Smith's comparing *hulstii* to *satyricus* was a slip. The species is a decided rarity here.

279. *U. satyricus* Grt.—I have never found this in any numbers, though it is much less rare than the preceding. It is extremely variable in the quantity and distribution of black and dark brown scales.

280. *Agrotiphila incognita* Smith.—This species is not in my collection, but I have seen the two male types from Laggan, though one of them is only labelled "B. C." in error. A male is in the British Museum, taken by Mrs. Nicholl in 1907, on Brobokton Creek, in the mountains far north of Laggan.

281. *A. maculata* Smith.—Though less rare than the preceding, this seems never to have been taken in any numbers. I have taken a few myself at Laggan, and Mrs. Nicholl has taken a few there and on Mt. Athabasca, and near Lake O'Hara, on the British Columbian side of the divide. My dates are all between July 16th and 27th. It is an above-timber species, occurring between 7,000 feet and the summits, though I have not been on any above 9,000 feet.

283. *Mamestra mystica* Smith.—In my note on this species in Vol. XXXVII, p. 151, line 5, for "The palest *discalis* and the darkest *mystica*," read, "the darkest *discalis* and the palest *mystica*." I overlooked the slip in the proofs. As to the distinctness of these two, there can be no doubt. In colour *discalis* is pale blue-gray, *mystica* lacks the bluish tint and is browner. They are also distinguishable on the characters previously pointed out. In colour and ornamentation *mystica* is really nearer *nimbosa*, and occasional specimens are indistinguishable. I had almost decided that they were forms of one species, when I discovered slight antennal differences, which may, however, prove to intergrade, though I have not both forms from the same locality. In my males of *nimbosa* from Montreal; Milwaukee Co., Wis.; and Vancouver Island, the antennæ are ciliate and bristled, with the joints scarcely marked. Some Pacific coast specimens have the ground colour very clean, with the brown irrorations very much reduced, though so far I have found nothing else about them to suggest distinctness of species. In my *mystica*, from Miniota, Man.; Alberta; and Windermere, B. C., the male antennæ are minutely serrate, fasciculate and bristled, the bristle appearing to be longest in Miniota, and shortest in Windermere specimens. In some of those from Miniota, however, the joints are scarcely marked, and the character may fail as distinctive. Sir George Hampson places *mystica* and *nimbosa*, with *rogenhoferi*, in a different group from *discalis* and *imbrifera* on antennal characters, as having them ciliate only. He has *mystica* from the type locality, Winnipeg, and I have not, though I have seen the type, and know the species well. *Discalis* has male antennæ serrate-fasciculate, but the serrations are not more prominent than in most of my *mystica*, and the bristle seems to be lacking. The type of *nimbosa* is a male in the British Museum from Trenton Falls, New York.

284. *M. imbrifera* Grt.—I have seen the type of this species in the British Museum, a female, which, according to the Catalogue, comes from

Trenton Falls, N. Y., the same locality as *nimbosa*. The male antennæ are minutely serrate-fasciculate, and strongly bristled. The serrations are less coarse though more distinct than in *nimbosa*, *mystica* or *discalis*, and the bristle longer than in the two former, *discalis* having none. I have it from Montreal; Biddeford, Maine; several Manitoba localities, and Red Deer River, near Gleichen, Alta. It seems much less common here in the hills, though I took a couple in the Upper Columbia valley, near Windermere, B. C. *Rogenhoferi* Möschler, as catalogued by Sir George Hampson, has male antennæ ciliate only. He had no specimens under the name in the collection, but figures as such a male from "W. Manitoba" in Prof. Smith's collection. This specimen I have examined. The label is, I think, in Mr. Hanham's writing, and the "W" probably stands for Winnipeg. When I saw it, it had a small piece only of one antenna, which my notes say were "ciliate, with joints little marked." It is something distinct from *imbrifera*, which I have often received under the name, and a species unfamiliar to me. Prof. Smith, in his Monograph of Mamestra, states that he has examined the male type from Labrador in Mr. Möschler's collection, and that "the antennal joints are distinctly serrated, and furnished with bristly tufts." (Pr. U. S. N. M., XIV, 204, 1891.) This leaves some doubt as to the correctness of the identity of the Rutger's college specimen.

284. The single specimen which I recorded under this number as *juncimacula* is probably a variation of *purpurissata* Grt. It is, however, extremely like Holland's figure of *juncimacula*, stated in the text to occur in Colorado, which is therefore presumably the locality of the specimen figured. Sir George Hampson's figure of a Colorado female is much more like the form described by Dr. Dyar from Kaslo as var. *crydina* (CAN. ENT., XXXVI, 32, 1904). Hampson lists *crydina* as a synonym of *purpurissata*, but had no Kaslo specimens in the collection. Prof. Smith, in Journ. N. Y. Ent. Soc., XV, 152, 1907, claims that *crydina* is a good species. I thought that might be so at one time, but after studying more material I find that the Kaslo form, as stated under the description, intergrades with eastern *purpurissata*, which is the predominating form at Calgary. The type of *juncimacula* Smith, is a male in the Washington collection, bearing no locality label. Neither, by the way, is the labelled "type" in Prof. Smith's handwriting, though bearing the Museum red type label. I have not seen the description, but the form appears to have

been described from the mountains of Colorado as a *purpurissata*, and subsequently, in Ent. News, IX, 241, Dec., 1898, separated as a species. My only Colorado specimen is a female from Durango, and looks like an obscure *purpurissata* merely. Vancouver Island specimens are paler and more distinctly maculate than any others that I have. I believe that *crydina* is merely a strongly marked form of *purpurissata*, and *juncimacula* is very doubtfully distinct.

287. *M. columbia* Smith.—I have seen two specimens of this form marked "type," both males labelled "Ft. Calgary, B. C.," one in the Neumögen collection, and the other at Washington. The description refers to both male and female types, which may be an error. In 1884, when Capt. Geddes collected the specimens, Calgary was merely a Northwest Mounted Police fort. The "B. C." error I have repeatedly corrected. Closer acquaintance has brought me to look upon this as a local race of *meditata* Grt. The majority of Calgary specimens are considerably paler than *meditata* from the Eastern States, and tinged with reddish rather than brown. Specimens from Cartwright, Man., and Redvers, Sask., include obvious intergrades, as well as specimens inseparable from some in both eastern and Calgary series, except in being smaller, as is usual with Manitoba and Saskatchewan races. *Determinata* Smith is a Colorado form very closely allied to these, with darker central band, and rather conspicuous discoidal spots, those in *meditata* and *columbia* being usually rather obscure, and sometimes scarcely discernible. Sir George Hampson separates *determinata* from the other two in the tables on the character of the orbicular being concave anteriorly. This is a variable character in my *columbia* series, in which I do not suspect two species. I have only a single Colorado male in my collection, from Colorado Springs, and a few of my local specimens come very near it. Prof. Smith has a good series from California.

288. *M. cervina* Smith.—I do not feel at all confident that this is distinct from *lustralis*, of which the type is a Wisconsin female in the British Museum. The eastern form does not appear to be very common, and I have not the material to enable me to form a definite opinion. The character by which Hampson separates *lustralis* from *cervina* in the table is the presence in the former of a black mark preceding the white patch near the anal angle in submedian fold. In his description, however, the mark is called brown. A brown mark is faintly discernible here in some of my local series of *cervina*. It is rather more evident in my one *lustralis*

from an unknown locality, and two from Sudbury, Ontario, which are the only eastern specimens which I possess. However, I see no differences that I should suspect of being specific. Cartwright and Miniota specimens in my collection are alike, and probably more typical *cervina* than those from Alberta, being a little smaller and darker. *Teniocampa suffusa* Smith, type, is an Arizona female in the Washington Museum, and appeared to me to be a pale *lustralis*, and is referred to that species by its author in his Check List.

{ 289. *M. segregata* Smith.

{ 290. var. *gussata* Smith.—I am convinced that these two are the same species. Dr. Dyar suggests in the Kootenai List that *gussata* is only a variety of *segregata*, and I agree with him. *Gussata* is less highly coloured than *segregata*, and has more black markings. In my former notes I stated that Sir George Hampson considered the two to be the same species. That was his opinion expressed in a letter to me about that time. Before publishing, however, he altered his opinion, as he places *segregata* in the genus *Polia*, and *gussata* in *Hyssia*, separating them in the Catalogue by 136 pages, and figures a Calgary specimen under each name. Prof. Smith, in Journ. N. Y. Ent. Soc., XV, 156-7, Sept., 1907, closely analyzes Hampson's descriptions of *Polia* and *Hyssia* and points out that there is no tangible difference except a very doubtful one of abdominal tufting. At the same time, he makes no suggestion that *segregata* and *gussata* are the same.

291. *M. negussa* Smith.—A series received from Redvers, Sask., from Mr. Croker, is very constant, which fact, in this genus, I accept as evidence in favour of distinctness from *segregata*, which the form resembles in almost every respect, only entirely lacking all black markings. Hampson places it in *Polia*, and figures a Calgary specimen as *plicata*, of which he makes it a synonym. The figure is bad, and too contrasting. He mentions in his description that the discoidal spots are defined by black, which is not the case in any of my Calgary or Redvers specimens. The male type of *plicata* from Glenwood Springs, Colo., has the spots outlined in black, and a black basal streak, agreeing in these respects with my only specimen from that locality, a female. *Negussa* is also slightly smaller, but whether really distinct I will not at present venture to suggest.

292. *M. neoterica* Smith.—I have now seen the types of this species from Winnipeg, and have a similar series in my collection from Cartwright. This form is small and rather dull and even in colour. Walker's type of *detracta* is a male in the British Museum from Trenton Falls, N.Y., where is also Grote's *claviplena* from Evans Centre. These two are certainly one species, and I cannot see that *neoterica* is anything but a local variation of it. Typical *detracta* is larger, more olivaceous, and usually far less even in colour. Calgary specimens are intermediate in average size, but nearest the eastern form in colour. Calgary and eastern specimens can be found exactly alike, but usually the former are paler. Dr. Dyar in the Kootenai List refers *neoterica* as a race of *detracta*, and mentions that the Kaslo form differs slightly from either, being dull and even like *neoterica* and large, like *detracta*. I have some from Provo, Utah, which are most like the Kaslo form, but paler. The relative difference in size between the sexes at Calgary and in the east, does not appear to be constant, the females seeming to average a trifle smaller than the males where the species occurs.

294. *M. meodana* Smith.—(Journ. N.Y. Ent. Soc., XVIII, 95, June, 1910.) This is the name which Prof. Smith has given to what I had listed as *liquida*, and he made a Calgary male and female type, and co-types from Calgary; Pullman, Wash; Yellowstone Park, Wyo.; Arrowhead Lake, B.C.; and Denver, Colo. He says: "The species has been confused with *liquida* Grt., which is a much more contrastingly mottled form occurring in Washington, and probably over a similar range. *Liquida*, as described, and as figured by Hampson, has narrower, more pointed primaries, and while the type of maculation is similar, *meodana* is neatly and quietly ornamented, while *liquida* is strongly contrasted and showy." In Ent. News., XXI, 398, Nov., 1910, I commented upon the forms, expressing a doubt as to their distinctness as species. I have little to add to that. Vancouver Island specimens in my collection are a bit brighter than typical *meodana*, which I look upon as variation rather than a species.

297. *M. nevadae* Grt.—One of my Calgary specimens I have compared with the type, a female (not male as stated in the Catalogue), in the British Museum, from the Sierra Nevada, California. Banff and Kaslo specimens are similar. Sir George Hampson makes *canadensis* Smith a synonym, as had previously been suggested by Dr. Dyar in the Kootenai

List. Prof. Smith, in Journ. N. Y. Ent. Soc., XV, 153, Sept., 1907, takes exception to this view, but suggests that they may be races only. He states that *nevadæ* is much brighter, more contrasting, and broader winged than *canadensis*. The latter was described from a unique male from the Province of New Brunswick, and the type, which I have not seen, is probably in the Thaxter collection in the Museum of Comparative Zoology at Cambridge, Mass. Dr. Dyar says that specimens from Wisconsin and from Kaslo, B. C., in the Washington Museum, are alike. I saw them there, and have no note that they differed. They stood, by the way, under *canadensis*, whilst Calgary specimens did duty for *nevadæ*. The *canadensis* of Prof. Smith's collection was a badly worn male from Winnipeg, which I should call about typical *nevadæ*. Last winter I examined a specimen from Hymers, Ontario, belonging to Mr. Winn, which I thought might be typical *canadensis*, as it almost entirely lacked the red shades of *nevadæ*, though doubtfully distinct therefrom. But, according to the description, red shades exist in *canadensis*. At present I have no evidence in favour of distinctness, though it requires more material to permit of a fair judgment.

298. *M. invalidu* Smith.—I have not taken this species here for some years, but it seems to be of more frequent occurrence at Banff, whence I have a few. I have no males in my collection, and I notice that an absence of that sex is complained of under the description, made from specimens from Sierra Nevada and Placer Co., Calif. I have seen a type at Rutgers College, another at Washington, and three are in the Henry Edwards collection, though I overlooked these. My Alberta specimens appear to be the same species. I have examined the type of Walker's *cristifera* in the British Museum, a worn specimen from St. Martin's Falls, Albany River, Hudson's Bay Territory. It is the specimen figured by Hampson, but most of the pale shades shown in the figure merely denote the worn condition of the specimen. He makes *lubens* Grt., "ab. 1," and *rufula* Morr., a synonym. Of the latter I know nothing, but *lubens*, of which the female type from New York is in the Museum also, is easily distinct, as pointed out originally by Grote in CAN. ENT., XXVI, 141-146, 1894, and latterly by Prof. Smith, who has suggested that *cristifera* may be prior to his *invalida*. I know nothing against the suggestion, and were it not that the worn condition of *cristifera* type leaves an element of doubt, I should say it was certainly correct.

NEW COLEOPTERA CHIEFLY FROM THE SOUTHWEST.—V.

BY H. C. FALL, PASADENA, CAL.

The new species herein described have, with a single exception, come to hand during the past year (1911) and seem worthy of prompt publication.

Quedius compransor, n. sp.

Robust, head and prothorax black, elytra and abdomen dark rufous, the latter dusky toward the base. Head including the mandibles (δ) slightly longer than wide, gradually wider posteriorly; eyes small, not at all prominent, distant from the nuchal constriction by about $2\frac{1}{2}$ times their longest diameter; a large setigerous puncture at the base of the antennæ, one at the upper margin of the eye, and two others posteriorly in a transverse line and fully twice as far from the eye as from the nuchal constriction; front without punctures. Labrum bilobed. Antennæ rather stout, filiform, but little longer than the head, joints 4-10 subsimilar and a little wider than long. Prothorax about $\frac{1}{4}$ wider than the head, $\frac{1}{5}$ wider than long and evidently wider than the elytra at base, and equal to the width of the latter posteriorly; narrowed in front, sides rounding into the base with but feeble evidence of hind angles; disk entirely without punctures, margin evidently but not strongly explanate posteriorly. Scutellum impunctate. Elytra subequal in length to the prothorax, punctuation fine and rather close throughout. Abdomen similarly but slightly less closely and evenly punctate. Head beneath with a few fine scattered punctures, lateral carina broadly interrupted. Hind tibiæ spinulose.

Length 9-11 mm.; width 2.5-3.2 mm.

Manhattan, Kansas.

Described from three males sent me by Mr. Knaus, who writes that they were taken Jan. 6, from the burrow of a "pocket gopher."

By Horn's table this interesting species would fall with *spelaus*, to which it is allied by the small eyes and explanate side margins of the thorax, this latter character being however less marked than in *spelaus*. It differs from *spelaus* in its stouter form, colour, ovate head (parallel at sides in *spelaus*), with the infraorbital carina obliterated except toward its extremities, and the absence of the usual discal series of punctures near the front of the pronotum, the marginal punctures only being present. The surface of the head and pronotum appears to the eye to be smooth and polished, but as in most species of the genus is really strigillate with

a system of exceedingly fine wavy lines with sparse very minute feebly impressed punctures, a little more evident on the head.

This is the first species to be described from our fauna without discal pronotal punctures. It is not possible to assert that their absence is constant, although completely wanting in the three specimens before me.

Tritoma tenebrosa, n. sp.

Very similar in size, form and colour to *unicolor*; broadly ovate, black, mouth, antennal stem, tarsi and tip of last ventral segment dark rufous or rufopiceous, upper surface very finely alutaceous throughout and rather dull. Head closely, distinctly but not coarsely punctate. Prothorax finely rather sparsely punctulate; punctures of elytral series moderately strong and close, nearly as in *unicolor*; intervals minutely sparsely punctulate. Body beneath dull, rather finely sparsely punctate, the ventral segments more closely so.

Length 4.8 mm.; width 2.75 mm.

Southern Pines, N.C. (Rev. A. H. Manee).

The resemblance to *unicolor* is very close in all respects except the lustre and sculpture of the pronotum, which in the latter species is strongly shining without alutaceous sculpture and with the punctuation relatively very coarse. *Angulata* is more nearly in agreement with *tenebrosa* in punctuation and surface lustre, but it is distinctly smaller, with finer less closely punctured elytral striæ and red legs.

Agrilus strigicollis, n. sp.

Form moderately stout, about as in *pensus* and *obolinus*, moderately shining, æneous, prothorax somewhat cupreous, beneath cupreo-æneous. Antennæ barely attaining the middle of the prothorax, serrate from the fifth joint, which is a little longer than wide, the following ones wider than long. Front broadly and rather deeply concave in superior half, the concavity confluent with a smaller post-clypeal impression, coarsely closely punctate, the punctures uniting in part to form short rugæ. Prothorax a little wider than long, sides nearly straight and parallel, narrowed only at the anterior angles; median line rather deeply impressed throughout, the impression broader behind; surface coarsely transversely strigose in wavy lines at the middle, the strigæ becoming longitudinal laterally; hind angles not carinate though with an obtuse elevation in the position of the usual carina, within which is a small basal impression, and another larger at the middle of the outer margin. Scutellum impressed and without transverse carina. Elytra scarcely sinuate behind the humeri, gradually narrowed

from about the middle, apices separately rounded and finely serrulate, surface rather coarsely imbricate, disk a little flattened at middle, pubescence very short, sparse and recurved, evenly distributed. Prosternum rather densely punctuate and with short recurved pubescence, lobe truncate and feebly emarginate; intercoxal process rather broad and seemingly obtuse at apex. Abdomen moderately punctate, last segment with a small emargination at apex; pygidium without projecting carina. Claws deeply cleft, the apices of the inner portions nearly in contact.

Length 9 mm.; width 2.35 mm.

The type is a female from the Huachuca Mts. of Arizona, collected and given me by Mr. Carl R. Coolidge.

This species is at once separable from any of our previously described forms by the combination of antennal and ungual character, no other species with the serration of the antennæ beginning with the fifth joint having the long inflexed claw tooth.

Diphyllostoma Fall.

The discovery of a second species of this remarkable Lucanid genus is, like the first, due to Mr. Ralph Hopping, of Kaweah, California. Of the specimens sent Mr. Hopping writes: "The Lucanid seems to have different habits from *fimbriata*, flying about 10 a.m. and in the pines at 6,600 ft. elevation, whereas *fimbriata* seems to be a night flier at 1,000 ft. A reference to the original description of *fimbriata* shows that at least one specimen of that species was taken in flight shortly after noon and it is doubtful if this distinction is more than incidental; the difference in altitude however is probably of more significance.

The new form agrees very closely in all essentials and most details with *fimbriata* and it is only necessary to refer the student to the description of the latter (CAN. ENT., 1901, p. 289), and state the differences.

D. nigricollis.

Form slightly narrower than in *fimbriata*, the prothorax a little smaller and black, the elytra piceo-testaceous, in *fimbriata* dark brown or castaneous and concolorous throughout; mandibular process less strongly emarginate; prothorax distinctly more finely and sparsely punctate, the elytra similarly but less deeply sculptured than in *fimbriata*. Tarsi a little longer and more slender, the joints more than three times as long as wide, while in *fimbriata* they are less than three times as long as wide.

Length $6\frac{1}{2}$ –8 mm.

Described from ten examples—all ♂s—taken at Huckleberry Meadow, Fresno Co., California, July 15 and Aug. 1; elevation, 6,600 ft.

Cremastochilus quadratus, n. sp.

Black, subopaque, above with very sparse short brownish erect or suberect hairs which become on the pronotal disk distinctly squamiform, varying from two to three times as long as wide; hairs beneath sparse and very short, stiff and setiform. Mentum deeply and regularly cupuliform, the margin entire. Head as in *schaumi* and *westwoodi*. Prothorax nearly one-half wider than long, widest across the hind angles which are not at all retracted, sides very broadly and just visibly sinuate before the hind angles, arcuately narrowed in front, the apex $\frac{3}{5}$ as wide as the base; front angles foveate, hind angles rectangular, triangularly smooth above, not limited within by an impression; disk broadly convex, median line impressed, punctures coarse and shallow, dense at sides, well separated toward the middle. Elytra moderately flattened, rather more so than in *westwoodi*, sculpture as in the latter species. Pygidium coarsely cribrate punctate. Body beneath coarsely moderately closely punctate. Tibiæ distinctly less broad than in *westwoodi*; front tarsi short, passing the apex of the tibiæ by only the terminal joint, or slightly more; middle tarsi subequal in length to the tibiæ; hind tarsi a little shorter than the tibiæ. All the tarsal joints are concavely compressed laterally, more strongly so basally, so that when viewed from above the joints appear much narrower at base.

Length 12.5-14 mm.: width 5-5.8 mm.

Described from three examples sent by Mr. Junius Henderson, of the University of Colorado, who took them at Ft. Mojave on the Colorado River in Western Arizona, March 16, 1911.

As indicated in the description, this insect is most nearly related to *C. westwoodi*, to which the student would be led by attempting to identify it by Horn's table of the genus. It differs markedly from that and other allied species, however, by the thorax not being narrowed behind; the pronotum is also more coarsely and less closely punctured toward the middle, the erect hairs are here more truly scales, the pygidium is more coarsely punctured, the tibiæ less stout, the front tarsi shorter and the mentum more deeply concave. The peculiar concave compression of the tarsal joints is not closely approached by any other species known to me.

Lachnosterna carolina, n. sp.

Moderately elongate, cylindrical, entirely rather pale rufo-testaceous, surface moderately shining. Clypeus broadly feebly emarginate, moderately reflexed, surface closely punctate, the front a little less densely so.

Prothorax fully twice as wide as long from a vertical view point, sides parallel posteriorly, accurately narrowed in front, margin entire, surface moderately closely, not coarsely, punctate. Elytra as closely and somewhat more coarsely punctate than the prothorax, costæ faint. Pygidium vaguely finely punctate and with a tendency to become longitudinally wrinkled. Metasternum closely punctate, hairs short and not dense. Abdomen finely sparsely punctate, nearly smooth at middle. Last joint of maxillary palpi fusiform ovate, slightly impressed.

Length 14-15 mm.; width $7\frac{1}{2}$ - $8\frac{1}{2}$ mm.

Male.—Antenna 10-jointed; club a little shorter than the stem; abdomen slightly flattened at middle, penultimate segment faintly sinuate at middle and with a slightly roughened arcuate impression which anteriorly attains the middle of the segment, and is about twice as wide as long; last segment with a shallow subrectangular emargination, the apical limiting angles not produced or acute, the bottom of the emargination feebly roughened on its extreme edge; surface of the segment with a transverse polished fovea occupying the entire length; inner spur of hind tibia short, varying from $\frac{1}{10}$ to $\frac{1}{4}$ the length of the long and slender outer spur.

This species is very closely allied to *ephilida*, which it resembles perfectly in all the more obvious characters. The latter, however, has a slightly longer antennal club, the abdomen in the male is distinctly channeled or concave at middle, the penultimate segment more evidently roughened posteriorly, the last segment more deeply emarginate, the lateral lobes more prominent, the posterior border of the emargination more widely and strongly roughened, the genitalia quite different, though of a similar type.

Described from five examples—all males—taken at Southern Pines, N.C., by Rev. A. H. Manee, the dates of capture ranging from June 14 to July 15.

Microphotus rinconis, n. sp.

Oblong, prothorax testaceous, the disk rather broadly infusate, elytra fuscous, under surface and appendages testaceous. Antennæ (δ) 8 or 9 jointed. Prothorax about $\frac{1}{4}$ wider than long, sides parallel posteriorly, arcuately narrowed in anterior half, the apex subangularly rounded; surface dull, coarsely reticulate punctate in front, somewhat less so behind, especially on the convex median portion of the disk, the latter neither channeled nor carinate. Elytra a little more than twice as long as the

prothorax, subparallel, rather coarsely but vaguely punctate, costæ variable in distinctness.

Length 6.1–6.6 mm.; width 2–2.4 mm.

Rincon Mts., Southern Arizona (Beyer).

M. octarthrus, n. sp.

Nearly similar to the preceding, the elytra and median parts of the prothorax fuscotestaceous. Antennæ 8-jointed. Prothorax but slightly wider than long, sides feebly obliquely convergent behind. Elytra a little shorter with sides more evidently arcuate in some specimens, the punctuation dense, rather coarse and better defined than in the preceding.

Length 4.75–5.3 mm.; width 2 mm.

Rincon Mts., Arizona (Byer).

Var. *pecosensis*, n. var.

Under this name I include as a variety or race of the above a series of four examples from Pecos, New Mexico, taken by Prof. Cockerell. They differ from the typical form by their larger size (5.5–6.6 mm.), relatively longer elytra, somewhat larger eyes and slightly less stout antennæ. One specimen is anomalous in its shorter elytra and is probably aberrant; it has, however, deterred me from describing this as a distinct species. This species or subspecies was recorded as *angustatus* in the New Mexico List, following LeConte's determination of Colorado specimens, which are probably the same thing.

M. decarthrus, n. sp.

Elongate, parallel, prothorax distinctly, elytra moderately shining, colour as in the preceding species. Antennæ 10-jointed. Prothorax slightly wider than long, sides a little more convergent behind, apex narrowly subtruncate at middle, surface shining, the punctures of different sizes, but as a whole finer, shallower and distinctly separated; median line channeled posteriorly. Elytra narrow, parallel, more than three times as long as the prothorax, punctuation close but vague and rather fine; costæ evident.

Length 6.6 mm.; width 2.2 mm.

Chiricahua Mts., Southern Arizona. A single specimen collected and given me by Mr. V. L. Clemence, of Pasadena, California.

The five species of *Microphotus* known to me may be easily separated by the following table, the characters of course pertaining to the males only :—

Elytra suboval, distinctly rounded on the sides *dilatatus*.

Elytra parallel, sides straight or but little rounded.

Prothorax not narrowed behind.

Prothorax semielliptical, widest at extreme base; elytra $2\frac{2}{3}$ to 4 times as long as the prothorax, brownish testaceous frequently with a pinkish tinge *angustatus*.

Prothorax with sides parallel posteriorly; elytra $2\frac{2}{3}$ to 3 times as long as the prothorax, fuscous in colour *rinconis*.

Prothorax obliquely narrowed behind, widest at about the middle.

Antennæ 8-jointed, prothorax more coarsely and densely reticulate punctate, less shining, the median line carinate or subcarinate posteriorly *octarthrus*.

Antennæ 10-jointed, prothorax more sparsely punctate and shining, median line sulcate posteriorly *decarthrus*.

So far as known, *dilatatus* is confined to the Cape region of Lower California. *Angustatus* occurs in and to the west of the Sierras from Southern California to Oregon.

There is a confusing disagreement in published references to *Microphotus* as to the number or antennal joints. LeConte, in the original diagnosis of the genus (based on *dilatatus*), describes these organs as 11-jointed. In his subsequent description of *angustatus* they are said to be 9-jointed. Later, in his synopsis of the Lampyridæ, the number of joints is given in the generic table as nine in the male and eight in the female, but in the remarks upon the genus which follow on the same page the males are said to have 10 and the females 9-jointed antennæ. The small subulate appendage to the terminal joint was evidently counted by LeConte in the original description, but not afterwards. So far as my material goes *decarthrus* alone has 10-jointed antennæ; of my three examples of *dilatatus* one has three organs 9-jointed, another 8-jointed, the outer joints being lacking in the third. In both specimens of *rinconis* the antennæ are evidently 8-jointed when viewed from the front, but there is a more or less complete division of the sixth joint on the lower and posterior sides so that viewed from that position they appear to be 9-jointed. In the eight examples of *octarthrus* the antennæ are uniformly 8-jointed, while in *angustatus* they are as constantly 9-jointed. The following measurements in millimeters of the length and width of the prothorax and the length of the elytra exhibit considerable variation, but the deduced ratios

are in most cases sufficiently different to be distinctive. No measurements of width of elytra are recorded, the tendency to warp, curl and separate when dry rendering them unreliable for comparative purposes.

	Length of Prothorax	Width of Prothorax	Ratio of Length to Width of Prothorax	Length of Elytra	Length of Elytra in Terms of Prothorax
<i>dilatatus</i>	2.30	2.95	.75	5.80	2.52
"	2.38	3.00	.76	6.40	2.69
"	1.78	2.25	.79	4.75	2.67
<i>rinconis</i>	1.85	2.20	.82	4.83	2.68
"	1.51	1.82	.83	4.60	3.05
<i>octarthrus</i>	1.50	1.53	.98	5.10	3.40
"	1.40	1.50	.93	4.75	3.39
"	1.50	1.60	.94	5.00	3.33
"	1.55	1.70	.91	4.00	2.58
var. <i>pecosensis</i>	1.50	1.62	.93	3.40	2.27
"	1.60	1.70	.94	3.55	2.22
"	1.40	1.52	.92	3.35	2.39
"	1.60	1.60	1.00	3.70	2.31
<i>decarthrus</i>	1.60	1.70	.94	5.00	3.13
<i>angustatus</i>	1.50	1.76	.85	5.95	3.97
"	1.50	1.75	.85	5.50	3.67
"	1.88	2.20	.85	7.00	3.72
"	1.34	1.50	.89	4.75	3.54
"	1.60	2.00	.80	6.25	3.91

Ammodonus granosus, n. sp.

Broadly oval, moderately convex, dull black, densely clothed above with appressed ash coloured scales varied with brownish, and with numerous short subrecumbent squamiform hairs which on the elytra are arranged subserially in great part; beneath with sparse appressed narrow scales or scale-like hairs, side margins of the body fimbriate with short feebly clavate squamiform hairs. Head and prothorax with numerous naked granules which are separated by about their own diameters on the head and anterior parts of the prothorax, a little less close toward the base of the latter. The prevailing colour of the scales is ashy, feebly nubilously varied with pale brown at the middle of the basal and apical parts of the pronotum; elytra with a uniformly slightly brownish shade along the suture, exterior to which is a fuscous basal spot and an irregular transverse median spot, and behind the latter and nearer to the suture than to the side margin, an elongate oblong spot of same colour.

Length 5 mm.; width $2\frac{3}{4}$ mm.

Rincon Mts., Southern Arizona.

Three examples of this interesting species were taken by Mr. G. Beyer, from one of which the above description is drawn. It is evidently

closely related to *A. fossor*, but differs notably in its conspicuously granulose head and pronotum, slightly wider head, less transverse prothorax— $\frac{3}{5}$ as long as wide—(about $\frac{1}{2}$ as long as wide in *fossor*) more pronounced elytral markings and stouter front tibiae with broader apical process. In *fossor* there are a few small granules on the head and pronotum, but these are discernible with difficulty, being nearly or quite concealed by the vestiture in all specimens I have seen.

I find it impossible from description to distinguish between *Ammodonus* and the genus *Scaptus* as defined in the "Biologia." *Scaptus tropicus* Kirsch, widely distributed over the central portions of the American continent and the adjacent islands, must be closely allied to the present species, and perhaps still more closely to *fossor*.

Supplementary Note on Microphotus.

Since sending the MS. of the present article to the publisher, Mr. A. B. Wolcott, of the Field Museum, of Chicago, has called my attention to some remarks on *Microphotus*, including the description of a new species, by Ernest Oliver, in the Revue Scientifique du Bourbonnais et du Centre de la France—1911, No. 3, p. 79. The author calls attention to the discrepancies in LeConte's writings as to the number of antennal joints, which I have alluded to above, and says that in all ♂s seen by him—excepting the new species about to be described—the antennae are 9-jointed. This new species has 10-jointed antennae and is described as follows:—

"*M. robustus*, n. sp.—Pallide testaceus, elongatus, antennis decem-articulatis; prothorace supra caput rugose et profunde punctato, lateribus leviter attenuatis, antice rotundato, basi vix sinuato, angulis rectis, carinate, pallide testaceo, macule parva basali rubescente; scutello testaceo, triangulari; elytris elongatis, subparallelis, fuscis, rugosis, obsolete costulatis, prothorace haud latioribus, apicem versus attenuatis; ♀ ignota. Long. 12 mill.—San Diego.

"Bien distinct des autres espèces par sa taille beaucoup plus grande, ses antennes de 10 articles, son prothorax court, atténué, à sommet bien arrondi, ses élytres acuminés, plus long que l'abdomen et un peu déhiscent à partir de la moitié de leur longueur, etc."

Where San Diego is we are not informed, but presumably in California. The size is much greater than in any species of the genus known to me, being nearly double that of *decarthrus*, which alone agrees with *robustus* in the number of antennal joints.

NOTES ON THE CHALCIDOID *TRICHAPORUS* FOERSTER
OF THE FAMILY EULOPHIDÆ, WITH DESCRIPTION
OF ONE NEW NORTH AMERICAN
FORM FROM ILLINOIS.

BY A. ARSÈNE GIRAULT, BRISBANE, AUSTRALIA.

History and Description.

Arnold Foerster in 1856, in his "Hymenopterologische Studien," designated as follows a group of generic rank called *Trichaporus*, which had no species named in connection with it. Quoting the table of genera given under his family Tetrastichoidæ we find the following omitting those portions of the table having no relevancy :

"a. Das Schildchen ohne Furchen.

b. Fühler scheinbar dreigliedrig *Triphasius* m.^a)

bb. Fühler deutlich mehrgliedrig.

c. Flügel ohne ramus stigmaticus *Anoxus* m.^{*)}

cc. Flügel mit einem ramus stigmaticus.

d. Der ganze Flugelrand mit langen Wimperhaaren
besetzt *Pterothrix* Westw.

dd. Der Vorderrand des Flügels ohne längere
Wimperhaare *Trichaporus* m.^{**)}

aa. Das Schildchen mit Furchen versehen.

e. Der Schaft übermässig verdickt (♂).

f. *Ceraniscus* Walk.

ff. *Baryscapus* m.^{***)}

ee. Der Schaft nicht übermässig verdickt.

g. (.....)

gg. *Hyperteles* m.^{†)}

..... *Tetrastichus* Hal.^{‡)}

pp. 83-84.

In the last paragraph of the next page (p. 85), Foerster stated in regard to the group *Trichaporus*: "Eine gleiche Bewandtniss hat es mit der Gattung *Trichaporus*. Von *Pterothrix* wird sie in gleicher Weise durch achthgliedrige Fühler beim ♂ und ♀ geschieden. Dazu kommt, dass die siebengliedrigen Fühler des ♂ von *Pterothrix* mit langen Haaren

a. The footnotes are omitted, with one exception—A.A.G.

**) *Trichaporus* von δειξ, τεῖχος, ἦ und ἄπορος ον, arm, dürftig. Im Vergleich zu *Pterothrix* erscheint der Flügel arm an Wimperhaaren.

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bekleidet sind, grade so wie bei den ♂ von *Tetrastichus*, bei *Trichaporus* aber sind sie ganz kurz und gleichförmig behaart. Der Flügel weicht ebenfalls von *Pterothrix* ab, indem er gleich *Anozus* am Vorderrande nur einen kurzen Haarsaum hat. Der deutliche *ramus stigmaticus* gibt aber auf der anderen Seite wieder ein gutes Unterscheidungsmerkmal der Gattung *Anozus* gegenüber ab."

Hence the group was originally defined as *tetrastichines*, having 8-jointed antennæ in both sexes, without a ring joint, and with uniform short hairs, the scutellum without furrows, the fore wings with a stigmal vein, but without long cilia on the cephalic margin.

Foerster gave nothing more concerning the genus; no species was mentioned as belonging to it; under the code it is therefore without status. Notwithstanding this, Taschenberg (1866) recognized the group, as did also de Dalla Torre (1898), the latter, however, placing it among the "*Genera Sedis Incertæ*" of the subfamily *Tetrastichinæ*, with the comment "*Species exstat.*"

In 1904 Ashmead took the name and applied it to a group of his own species and one of Philippi's (1873), still quoting Foerster as responsible for the name, and stating that the type was unknown but giving a wholly different definition of the genus. Several years earlier Ashmead (1900) removed *Euderus columbianus* Ashmead to *Trichaporus* Foerster, thereby recognizing the latter. This species can not become the type of the genus, since Ashmead in 1904 defined the genus with characters which *columbianus* does not possess. *Trichaporus* Foerster, 1856, being non-existent, the group *Trichaporus* defined by Ashmead in 1904, and referred to Foerster, 1856, should become a *genus novum* Foerster without designated type. For the latter purpose I select *Trichaporus melleus* Ashmead, 1904, being one of the species upon which the definition of the genus was evidently based, and the first one described by Ashmead in 1904. (*Exurus*) *Trichaporus colliguayæ* (Philippi, 1873) is the first species listed by Ashmead in 1904, but this is not selected as the type of the genus because of the fact that it may not have been actually seen by him, and its reference to this genus is, I believe, somewhat doubtful. I retain the original spelling of Foerster—*Trichaporus*.

The genus has no synonyms, unless *Exurus* Philippi, 1873, should prove to be such. It is true that Ashmead (1904, p. 374) designated *Euderus* Thomson (*sic*) (1878, p. 276) to be a synonym of *Trichaporus* Foerster, 1856. But in the first place the latter was non-existent, and secondly, Thomson never described a genus called *Euderus*, but distinctly

(in the place cited) quotes Haliday as being responsible for the group, in fact as he was. *Euderus* Haliday has little in common with *Trichaporus* Foerster.

The characters of the new genus, extracted from the key of the Tetrastichini as given by Ashmead (1904, pp. 348-349), are as follows: Tetrastichines with a sessile cylindrical abdomen as long as, or longer than, the thorax, and convex above (dorsad), a slender marginal vein in the hind wings, the mesonotum without a median groove, the pronotum not conical, the antennæ 9- or 10-jointed with one or two ring-joints, the scutellum with four (or two?) longitudinal grooved lines, the metanotum usually punctate, and the head, thorax and abdomen punctate or shagreened; the fore wings with short marginal fringes, the hind wings not acutely pointed at apex and the segments of the abdomen subequal in length. The genus is closely related to *Tetrastichodes* Ashmead on the one hand and to *Syntomosphyrum* Foerster on the other.

Ashmead always spelled the name *Trichaporus* instead of *Trichaporus*; as stated, I have adopted the latter as being correct.

The genus as it now stands contains six species, two of which (*colliguayæ* and *columbianus*), however, are more or less doubtfully placed. I have been unable to gain access to the types of any of the species.

Host Relations.

The habits of the parasites of this genus are not well known. In fact, in no case is there a definite record of the host of any one species, and but three of the species have been in any way connected with hosts. *Trichaporus columbianus* (Ashmead) is stated by Smith (1900) to live in cecidomyid galls; *colliguayæ* (Philippi) was reared in large numbers from a gall on *Colliguaya odorifera* Molina in Chile, but under circumstances which would necessitate confirmation of this gall-forming habit; it is possible that the gall was cecidomyid, and the species parasitic on the latter; *æneoviridis* was reared under conditions which make it impossible to decide whether it is parasitic on an ichneumonid, a syrphid or a larva of a lasiocampid moth. Nothing definite can therefore be stated in regard to the host relations of the genus.

Distribution of the Genus.

The species of the genus *Trichaporus* as now known are restricted to the Western Hemisphere, and the majority of the species belong to South America; *melleus* Ashmead, *viridicyaneus* Ashmead, *Persimilis* Ashmead

are known from Brazil only; *colliguayæ* (Philippi) from Chile. The North American species are: *columbianus* (Ashmead) [Florida, District of Columbia, New Jersey]; and *aneoviridis* Girault (Illinois). Of the six species of the genus, four are South American and two North American, and the genus as a whole is distributed between the meridians of 40.6° and 89.2° west longitude, and between the parallels of about 40° south and 42° north latitude.

(To be continued.)

NEW SPECIES AND GENERA OF NORTH AMERICAN LEPIDOPTERA.

BY WM. BARNES, M.D., AND J. H. MCDUNNOUGH, PH.D., DECATUR, ILL.

(Continued from page 22.)

Leucania suavis, sp. nov.

Head and thorax clothed with olivaceous hair; primaries straw-coloured, slightly sprinkled with black atoms, especially along inner margin; a dark shade extends from base of wing above cubital vein and along vein 5 to outer margin; veins in outer portion of wing finely lined on both sides with dusky; an indistinct oblique row of black dots across the wing beyond the cell, not attaining costa; a faint row of black marginal dots, mostly incomplete; fringes whitish. Secondaries deep smoky in ♂, fringes pale, cut by a dark line; in ♀ smoky, but much lighter than in ♂, an incomplete row of terminal dots and pale fringes without dark line. Beneath primaries smoky, outer margin and a ray extending outwards from discocellular vein pale straw-colour; secondaries pale, slightly suffused with smoky; a small discocellular spot and incomplete row of terminal dots on each wing. Expanse, 31 mm.

Habitat: White Mts., Ariz., 1 ♂, 6 ♀s. Type, collection Barnes.

Our single ♂ specimen shows a black dot at the inception of vein 2 of primaries, and another below it on anal vein; these are lacking in the ♀s. The species may easily be separated from all other N. Am. species of the genus *Leucania*, as defined by Hampson, by the fact that there are no black lines in the interspaces of the veins in the terminal area.

Trachea cara, sp. nov.

Palpi blackish outwardly; head and thorax clothed with an admixture of reddish-ochreous and black scales; an indistinct black transverse line on tegulæ and a rather more distinct black line before upper margin

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of patagia. Primaries purplish-red, suffused with ochreous; a black basal dash extending to t. a. line; basal line only indicated by a slight dark mark on costa, surrounded by diffuse ochreous shading; t. a. line indistinct in costal half of wing, indicated by two spots on costa, below basal dash distinct, geminate, black, filled with ochreous, and bent inwards to inner margin near base; beyond t. a. line considerable ochreous shading, especially along inner margin; orbicular round or slightly oval, outlined partially in black, with ochreous annulus and smoky central portion; claviform a slight black arrow mark below orbicular, not extending back to t. a. line and preceded by ochreous shading; reniform large, constricted centrally, the lower portion considerably broader than the upper, outlined in black, with dark centre; a slight dark median shade angled at reniform; t. p. line indistinct in costal portion, geminate, black, the inner line most distinct, filled with ochreous, outcurved around reniform, almost touching same at base, from which point it is evenly oblique and slightly lunate to inner margin; space between it and reniform shaded with ochreous; several pale dots beyond on costa; subterminal space even purplish-red, with little ochreous shading; s. t. line pale, wavy, crossed by two black sharply defined lines above and below vein 5, reaching from outer margin almost to t. p. line; terminal space with less reddish than remainder of wing, crossed by black line below vein 7, and with faint black mark on vein 2, neither of these crossing subterminal line; a terminal series of small black lunules; fringes dusky, streaked with ochreous opposite veins; secondaries smoky, with an incomplete dark terminal line; fringes smoky, with slight pinkish tinge, cut indistinctly by a darker line. Beneath smoky, with slight pinkish tinge, traces of a medial line on primaries mostly confined to costal area, distinct medial line and discal dot on secondaries. Expanse, 32 mm.

Habitat: Eureka, Ut.; Provo, Ut., 2 ♂s, 1 ♀. Type, collection Barnes.

Very similar in maculation to *T. adnixa* Grt., but lacking the blackish mark in subterminal area below vein 2, which is mentioned by Hampson (Cat. Lep. Het., VII, 187) in his description, and is also present in a coloured drawing of the type in the Tepper collection, which we possess. We have several specimens from Vanc. Is., B. C., which we take to be *adnixa*, and which are generally darker in ground colour, with a more prominent light patch beyond reniform; the black lines on each side of vein 5 are also not so clearly cut in the B. C. specimens, tending to

become suffused with each other, and the s. t. line is more prominent and distinct.

Hadenella cervoides, sp. nov.

Palpi outwardly dark brown, scaled with white at base, upturned, third joint short, porrect, antennæ ciliate; front and thorax closely scaled with brown and pale scales; divided scale tuft on metathorax; primaries brown, ordinary lines wanting, two black spots on costa above orbicular and reniform indicating their position, and a faint pale shade-line beyond reniform giving the approximate course of t. p. line; orbicular and reniform small, outlined in white, former round, latter kidney-shaped and open towards costa; faint terminal row of black dots, preceded by much more distinct pale ones, from the inferior one of which a slight black dash extends inwardly; fringes long, dusky, cut by a darker line. Secondaries smoky; fringes whitish, cut by a broad dark shade; beneath smoky brown, secondaries white at base and inner margin. Expanse, 25 mm.

Habitat: Redington, Ariz., 1 ♂. Type, collection Barnes.

The generic reference is doubtful; the front has a small truncate prominence, with raised edges and slight central process, but as the abdomen is devoid of squamation we are unable to tell whether tufts are present or not; in general appearance it fits in very well with *pergentilis*. We thought at first this might be *Fotella notalis* Grt., but as far as can be judged by Grote's rather meagre description, combined with Hampson's remarks, this is a larger species (34 mm.), without orbicular, and with a pale terminal border.

Perigea orta, sp. nov.

Palpi ochreous, sides of 2nd joint and 3rd joint dark brown; front ochreous, shaded posteriorly with dark brown; base of tegulæ ochreous, bordered with a dark line; remainder of head and thorax clothed with an admixture of reddish, ochreous and dark brown scales; abdomen yellow-brown, with darker tufting; primaries dark brown, with a distinct reddish tinge; maculation indistinct; basal line represented by two dark streaks on costa, with intermediate space filled with olive; t. a. line geminate, inner line obsolete, filled with olive shading, slightly oblique in course, dentate, a small inward angle below costa, prominent ones in the cell and on vein 1; orbicular small, round, partially outlined in black, filled with olive; claviform, when present, a small blackish blotch resting on t. a. line, and occasionally filled with olive; reniform large, the lower portion filled with a prominent quadrate white patch shaded inferiorly with black,

the upper portion filled with several irregular olive spots and dashes, separated from each other by dusky shades; above reniform on costa a small olive dot; t. p. line indistinct, broken, represented by a series of olive spots, shaded inwardly more or less distinctly with black sagittate marks, and followed by a row of minute white dots on the veins; in course parallel to outer margin, slightly incurved in submedian fold; s. t. line usually very indistinct, marked by the difference in shade between the dark subterminal and the ochreous shaded terminal spaces, irregular, incurved opposite cell, dentate on veins 2-4, occasionally preceded by black sagittate marks, most prominent in costal half; terminal area usually but slightly lighter than subterminal portion; at times rather heavily streaked with ochreous; a dark terminal line, broken by yellow points opposite the veins; fringes dark, rayed with ochreous or olive opposite the veins. Secondaries entirely smoky, with broken dark terminal line. Beneath primaries smoky, costa and outer margin ochreous, shaded with pinkish; secondaries whitish, sprinkled with smoky; a more or less evident discal spot and postmedian line on both wings. Expanse, ♂ 23 mm.; ♀ 28.5 mm.

Habitat: Gila Co., Ariz. (2 ♂s, 5 ♀s); Redington, Ariz. (1 ♂, 2 ♀s); Santa Catalina Mts., Ariz. (1 ♀). Types, collection Barnes.

The species bears considerable resemblance to *vecors* Gn., is, however, much smaller, lighter in appearance, and differs in the marking of the reniform, as well as in other minor details; it shows considerable variation as regards the distinctness of the subterminal line and the shading in terminal space. It is possibly Mexican, but we can find nothing in Hampson's work that agrees with it.

Oligia (Hadena) tonsa ab. *fasciata*, ab. nov.

Maculation as in *tonsa* Grt., or *subjuncta* Sm.; the ground colour of the wings, however, is white, streaked slightly with blackish; a broad red-brown band stretches across the median area of wing, bordered inwardly by the t. a. line, outwardly in the upper portion by the inner margin of the reniform, in the lower portion by the curved t. p. line; in the basal area of wing, near inner margin, two short black streaks, and a black dash across the median band as in *tonsa*; orbicular and reniform white, former very prominent against the dark surrounding area, latter with a slight yellowish outer shading between it and t. p. line. Secondaries deep smoky. Expanse, 22 mm.

Habitat: Eureka, Ut., 1 ♂. Type collection, Barnes.

This very striking form we received, along with a number of ordinary *tonsa*, from Mr. T. Spalding. As it agrees exactly in the course of the lines and general maculation with these specimens, we prefer to regard it for the present as an aberration, although it may prove to be a good species.

Athetis (Caradrina) mona, sp. nov.

Palpi outwardly black, 3rd joint pale ochreous; head and thorax gray, latter slightly paler; primaries very even dark gray-brown, with a sprinkling of black scales; t. a. line fine, black, slightly broken, originating from a black spot on costa; wavy and somewhat outwardly inclined; orbicular a small dark spot; reniform large, concave towards apex of wing, the concavity outlined in yellow, basal half outlined with white dots, 4-5 in number, central portion very slightly darker than rest of wing; on costa above reniform a dark spot; a faint dark median shade; t. p. line faint, crenulate, evenly sinuate; s. t. line barely visible, pale ochreous, irregular; terminal area slightly darker than remainder of wing; indistinct dark broken terminal line bordered outwardly with paler. Secondaries white, with broad outward dusky suffusion and dark terminal line, fringes pale, cut by a dark line near base. Beneath primaries wholly smoky, with faint discal dot and traces of postmedian line; secondaries white, sprinkled with brown along costa and outer margin, with distinct discal dot. Expanse, 22 mm.

Habitat: Witch Creek, San Diego Co., Calif., 1 ♀. Type, collection Barnes.

A species resembling certain forms of the European *selini* rather than any American species known to us; *multifera* Wlk. is probably its closest ally.

Papaipema errans, sp. nov.

Head and thorax purplish-brown. sprinkled slightly with white; tegulae tipped with white; primaries purple-brown, sprinkled with white and suffused with golden-yellow, which is particularly prominent along inner margin to t. p. line and in terminal space; all maculation dull and indistinct; t. a. line only distinguishable as a fine dark line crossing the yellowish area near inner margin; above this two oval dark shades represent claviform and orbicular; a dark median shade with prominent outward angle on cubital vein, inwardly oblique from below reniform to near t. a. line; t. p. line fine, rigid, inclined slightly outward from reniform to inner margin, separating gradually from median shade, and approaching

subterminal line; beyond it on costa several pale dots; reniform an obscure, dark, figure-of-eight shade; subterminal area lighter and more evenly purplish than remainder of wing; s. t. line marked by difference of shade between subterminal and terminal areas, shaded inwardly with smoky brown; terminal area with golden tinge; fringes dark. Secondaries smoky, paler basally, with obscure discal mark; beneath smoky, with discal dots and obscure postmedian lines on both wings. Expanse, 26 mm.

Habitat: White Mts., Ariz., 1 ♂. Type, collection Barnes.

Related to *unimoda* Sm., but the t. p. line is not lunulate, and is distinctly bent outward towards inner margin.

Too late to avoid publication we learn that in the foregoing article on "New Species and Genera of Lepidoptera" we have in two instances created a synonym. Our species *Hudenella cervoides* proves to be *Caradrina fragosa* Grt.; Dr. Barnes has just recently compared the two types. Our new genus and species *Friesia anormalis* is Grote's *Prosoparia perfuscaria*, placed at present in the *Geometridæ*. Mr. J. A. Grossbeck has sent us a specimen compared with the type, remarking at the same time that it is a Noctuid; we are glad to find our opinion supported by such a good authority, and trust that our figures of the structural features may serve to elucidate and augment Grote's very meagre and inadequate description.—J. H. McDUNNOUGH.

FURTHER NOTES ON DIABROTICA.

No. III.

BY FRED. C. BOWDITCH, BROOKLINE, MASS.

(Continued from page 16.)

D. quadrinotata, nov. sp.

Head black; antennæ long, black, joints 9-11 flavous, except extreme tip of last. Thorax wider than long, flavous, shining, finely sparsely punctulate, trifoveate, nearly straight on sides, angles all acute; scutellum black; elytra somewhat dilated at rear, thickly finely punctate, light pale flavous, each elytron with two small black spots, a humeral or subhumeral and a submedian. Body beneath black, legs black, femora flavous, under side of thorax flavous. Length, 8 mm.

Two examples, Peru, green label (Marcapata?).

The antennæ are nearly as long as the body (♂), or shorter than the body (♀); joint 3 nearly as long as 4; head with a deep fovea. The

thoracic fovea are well marked and connected by a well-marked depression, and one example has a median piceous mark at the rear. The elytra are much wider than the thorax, convex, very thickly punctured, almost obsoletely granular, the black spots relatively small but very conspicuous. Somewhat similar in shape and appearance to *7-punctata* Jac. from Parada, Mex.

D. bicincta, nov. sp. (Jac. in litt.).

Head black; antennæ black, last 3 joints (♂?), or 4 joints (♀?), flavous, except tip of 11. Thorax punctured, flavous, trifoveate; scutel black; elytra thickly and rather coarsely punctate, flavous, a broad basilar and somewhat narrower submedian fascia dull black, neither quite attaining the margin. Thorax beneath and mesosternum flavous, rest of body black, legs black with yellow femora. Length, $4\frac{1}{2}$ –5 mm.

Five examples, Marcapata, Peru.

This form has been distributed with the manuscript name *bicincta* Jac. Four co-types have been sent me by Messrs. Staudinger & Bang-Haas. It is a pretty little species, and easily recognized by the two black fasciæ. The antennæ are long and slender, and nearly equal to the length of the body in the ♂. The apparent difference in the number of white joints may be significant of similar variation in other so-called species. The elytra are depressed near the scutel and not at all plicate; in one example the suture is very narrowly black between the bands. One example has the rear band abbreviated into two spots, the anterior band much narrowed, and joint 8 of the antennæ half black and half white.

D. parambaensis, nov. sp.

Head rufous; front in the ♂ profoundly excavate concave, in the ♀ convex; antennæ flavous, fuscous at tip, joint 2 very short, 3 several times longer than 2 in the ♂, stout, *curved*, and a trifle longer than 4; in the ♀ relatively shorter, equal to 4 and *both joints* cylindrical. Thorax rufous, polished, *distinctly punctulate*, deeply bifoveate and obsoletely depressed before the scutel, which is black; elytra shining black, punctured subseriately on the disk, becoming obsolete behind, the tip moderately, and a narrow median fascia bright, yellow. Thorax below red and black, body black, edges of the segments narrowly flavous, legs bright yellow, extreme tip of tarsi fuscous.

Var. A with small yellow subbasal median dot.

Six examples of typical form, "Paramba 3500 iv; '97," dry season (Rosenburg); 14 examples from Cachabé seem the same, though smaller,

and with the upper flavous marks occasionally joined along the margin. Length, $5\frac{1}{2}$ –7 mm.

Seems close to *excelsa* Baly (which I have not seen), but that species is said to have the thorax *impunctate* and the elytra obsoletely "elevato-vittatis," and the length is $9\frac{1}{2}$ mm. Curiously enough, the description of *excelsa* does not mention the shape of the third antennal joint, except inferentially in the statement, "the fourth cylindrical, not curved." The curved third joint in the ♂ of *parambaensis* is very marked, and allies it closely to the Central American forms, *lepida* Say and *variabilis* Jac. It seems to indicate a tendency towards the dilated joint of the ♂ of *Ceratoma*. All the forms in Baly's paper, sec. K, with concave front in the ♂, are represented in my collection, with the exception of *excelsa* Baly. The forms *imitans* Jac. (type in my collection) and *deliciosa* Baly have a very strong tendency to run together.

In *parambaensis*, the entire front is occupied in the ♂ by the concavity, which is very deep; the antennæ are about half as long as the body, and if the small second joint is bent to a particular angle it pushes up a supplemental hinge, which appears at first sight like a small joint. The thorax is wider than long, sinuate and angled behind; the lateral fovea oblique and deep, and a distinct antescutellar depression is present; punctuation fine, but perfectly distinct; elytra with the usual shape of species of this section, quite strongly punctate, subseriately on the disk, becoming obsolete behind, transversely depressed behind the scutel and subplicate. The Cachabé specimens, as a rule, are smaller and with smoother elytra. Apparently a common form. The species of this section K need large series to determine the species, and even then it is difficult.

D. stuarti, nov. sp.

Head yellow; mouth black; antennæ yellow, tip of last joint dark. Thorax yellow, bifoveate; scutel blackish rufous; elytra thickly and rather coarsely punctate, yellow, with the rear part nearly to the middle semi-shining blue-black. Beneath yellow, with metasternum and abdomen black; legs yellow, tibiæ and tarsi and apex of femora dark fuscous.

Two examples, San Augustin, Mapiri, 3,500 feet, Sept. 1896 (M. Stuart). Length, 10 mm.

Belongs to sec. M, and should be placed near *dimidiata* Baly. Head with front distinctly carinate, antennæ reaching to just within the black

apex of the elytra, with joints 3 and 4 nearly equal; thorax transverse, margined, all the angles acute, sparsely, finely and evenly punctate. The elytra are slightly dilated at rear, just a trifle more than in *prodiga* Er., and not as much as in *dimidiata* Baly. The rear tibiæ are rather darker than the others. The only one of its large allies having a black scutel is *prodiga* Er.

D. haenschi, nov sp.

Head rufous flavous; mouth-parts piceous; front carinate; antennæ black, with extreme base rufous. Thorax transverse, shiny, rufous flavous bifoveate, depressed, with all the angles prominent and a few scattered punctures; scutel rufous; elytra dilated behind, thickly and almost rugosely punctured, especially behind; yellow, with the rear half black. Below, thorax and mesosternum yellow, remainder black, legs black, with base of femora rufous. Length, $5\frac{1}{2}$ –6 mm.

Type, Balzabampa. Ecuador (R. Haensch); also Sn. Inez, Ecuador.

Belongs to sec. M, and comes nearest to *atriventris* Jac., from Ecuador, but is easily distinguished by the black legs.

The antennæ are long and slender, and reach nearly to the tip of the elytra. The Sn. Inez example is much less rugosely punctured than the type.

D. marcapa, nov. sp.

Head, thorax, antennæ, scutel, rear half of the elytra, body beneath and legs black, with a faint tinge of green on the thorax; anterior half of the elytra bright rufous; thorax with three deep fovea, and distinctly though sparsely punctate; elytra thickly and coarsely punctured, becoming obsolete at the rear. Length, 7 mm.

One example, Peru, green label (Callanga?), Jacoby collection.

This species should be placed in sec. M, though the form is more like that of some of the species of sec. L. Head with carinate front and hairy, especially in front of the eyes; thorax strongly transverse, margined, with oblique lateral fovea, the rear round and just in front of the scutel; the elytra only slightly dilated behind. The antennæ are about three-fourths the length of the elytra, and joint 3 is not quite as long as 4. The extreme base of the femora is piceous. The tibiæ are noticeably covered with sericeous hairs.

D. cyaneo-maculata, nov. sp. (Jac. in litt.).

Head and thorax yellow; antennæ, except the extreme base, black. Thorax bifoveate and depressed; scutel yellow; elytra yellow, slightly dilated at the rear thickly, coarsely and subseriately punctured, with a large cyaneous blue spot occupying the whole apical third, leaving the extreme margin narrowly flavous to the tip. Body beneath paler yellow, legs yellow, with tibiæ, tarsi and upper surface of apex of femora black. Length, $5\frac{1}{2}$ mm.

Five examples, Callanga, Peru.

This species has been distributed with the manuscript name *cyaneo-maculata* Jac. Of what purport to be three co-types sent me by Messrs. Staudinger & Bang-Haas, two belong to a different genus. The antennæ attain the apical spot; joint 3 a trifle shorter than 4. The thorax is finely but obviously punctulate, while the elytra show here and there fragments of smooth lines between the punctures. In one of the specimens the apical spot includes the side margin, in the typical form it does not.

D. cyaneo-plagiata, nov. sp.

Head yellow; mouth-parts dark; antennæ black, piceous at base, joints 9-11 flavous, with extreme tip of last dark. Thorax flavous, bifoveate, a sublateral dark streak on each side, not attaining either edge; scutel flavous; elytra flavous rufous, dilated behind, coarsely thickly punctured, with a common apical cyaneous blue spot, which does not attain either the side or apex. Body beneath flavous, legs flavous, with apex of femora and tibiæ and tarsi black. Length, $4\frac{1}{2}$ mm.

One example, Peru, green label (Callanga?).

Superficially like *cyaneo-maculata*, but the light joints of the antennæ and the black streaks of the thorax at once separate it. The elytral spot is smaller; the elytral punctuation is coarse, subseriate in the disk, and becomes obsolete behind and at the sides.

A CORRECTION.

From the description of *Gnorimoschema septentrionella*, in the December number, p. 422, some words have been left out. The description of the hind wing of the insect should read: *Hind wing* dark grey—dries with a gloss. Fringe lengthening towards the body to $3\frac{1}{2}$ millimetres at the longest part, light brown.—T. W. F.

WASHINGTON MEETING OF THE ENTOMOLOGICAL SOCIETY OF AMERICA.

The sixth annual meeting of the Entomological Society of America was held in Room 376 of the new U. S. National Museum Building on Tuesday and Wednesday, December 26 and 27.

The following papers were read:—

Herbert Osborn.—Faunistic studies in entomology.

E. P. Felt.—Numerals as aids in classification.

E. S. Tucker.—Studies of insects bred and collected from the American mistletoe. Presented by Andrew Rutherford.

H. C. Severin.—The influence of temperature on the moulting of the walking-stick, *Diapheromera femorata*. (Title only.)

R. Matheson and C. R. Crosby.—Notes on aquatic Hymenoptera. Presented by C. R. Crosby.

Ann H. Morgan.—Photographs illustrating the life histories of May-flies.

H. Y. Tsou.—The Chinese wax-scale, *Erecerus pe-la*.

A. D. MacGillivray.—The lacinia in the maxilla of the Hymenoptera.

Lucy Wright Smith.—Glycogen in insects, especially in the nervous system and the eyes.

J. A. Nelson.—Note on an abnormal queen bee.

J. Chester Bradley.—The designation of the venation of the hymenopterous wing.

Ann H. Morgan.—Homologies in the wing-veins of May-flies.

A. D. MacGillivray.—The pupal wings of *Hepialus thule*.

J. Chester Bradley.—The wing venation of chalcid flies.

F. M. Webster.—Our present educational system in relation to the training of economic entomologists.

C. W. Johnson.—The use of colour in designating types and varieties.

Leonard Haseman.—Entomological work in Missouri.

Herbert Osborn.—A problem in the flight of insects.

E. P. Felt.—The biology of *Miastor* and *Oligarces*.

P. P. Calvert.—Seasonal collecting in Costa Rica.

W. L. W. Field.—Hybrid butterflies of the genera *Basilarchia*.

The following papers were read by title only, because of the expiration of the time allowed for the reading of papers :—

O. A. Johannsen.—Cocoon making by *Bucculatrix canadensisella*.

J. G. Needham.—Some adaptive features of myrmeleonid venation.

E. H. Strickland.—The Pezomachini of North America.

Z. P. Metcalf.—Homologies of the wing-veins of Homoptera Auchenorrhynchi.

The following officers were elected for 1912 :—

President.—S. A. Forbes.

First Vice-President.—A. D. Hopkins.

Second Vice-President.—C. P. Gillette.

Secretary-Treasurer.—A. D. MacGillivray.

Additional Members of Executive Committee.—J. H. Comstock, John B. Smith, Henry Skinner, Herbert Osborn, E. D. Ball, P. P. Calvert.

Member of Committee on Nomenclature for three years.—H. T. Fernald.

The Society adjourned, to meet with the American Association for the Advancement of Science, at Cleveland, Ohio, January, 1913.

ALEX. D. MACGILLIVRAY, Secretary-Treasurer.

FINAL REPORT OF THE JAMES FLETCHER MEMORIAL COMMITTEE OF THE OTTAWA FIELD NATURALISTS' CLUB.

The Memorial Fountain, erected on the Central Experimental Farm, was unveiled on July 19th, 1910. Several hundreds of people were present at the ceremony, including some distinguished visitors from a distance. Official representatives of the Royal Society of Canada, the Entomological Society of Ontario and the Ottawa Field Naturalists' Club, were present, and took a prominent part in the proceedings. The Fountain, including the medallion, is the work of Dr. R. Tait McKenzie, of the University of Pennsylvania, Philadelphia, U. S. A.

The Memorial portrait, which is the work of Mr. Franklyn Brownell, R.C.A., was unveiled at an evening meeting of the Ottawa Field Naturalists' Club on January 9th, 1912. It is an exceedingly good likeness of the late Dr. Fletcher, and, as most satisfactory arrangements have been made with

the Municipal Library Board and the Librarian of the Carnegie Library, the portrait will be hung in a prominent place in this latter building.

CASH STATEMENT.

Receipts.

Total amount paid by subscribers.....	\$1838 85
Bank interest.....	22 61
	<hr/>
	\$1861 46

Expenditure.

Cost of Memorial Fountain.....	\$1500 00
Cost of Portrait, including frame.....	225 00
Miscellaneous expenses : printing envelopes, receipt forms, postage, travelling, etc.....	136 46
	<hr/>
	\$1861 46

On behalf of the Committee,

ARTHUR GIBSON, Secretary-Treasurer.

Ottawa, January 29th, 1912.

ADDITIONS TO THE LIBRARY.

The Librarian of the Entomological Society of Ontario has much pleasure in acknowledging the receipt of the following publications, a present from the Trustees of the British Museum, London, England : "Monograph of the Culicidæ of the World," by F. V. Theobald, Vols. 3 and 5 ; "Synonymic Catalogue of Orthoptera," by W. F. Kirby, Vol. III; "Illustrations of Lepidoptera," Parts 6 to 9, 4 vols., quarto, illustrated with beautiful coloured plates.

These books form a very welcome addition to the library.

M. PAUL NOEL, Directeur du Laboratoire Regional, d'Entomologie Agricole de la Seine-Inferieure, Route de Neufchatel, 41, Rouen, France, desiring to publish a work on the properties which certain female insects possess of being able to attract the males from a great distance, will be very grateful to entomologists who would be willing to give him any well-authenticated facts relating to this attraction. He would send in return some of his entomological publications and the work in question immediately after it is printed.

Mailed February, 9th, 1912.

The Canadian Entomologist.

VOL. XLIV.

LONDON, MARCH, 1912.

No. 3

NOTES ON GEOPHILOIDEA FROM IOWA AND SOME NEIGHBOURING STATES.

BY RALPH V. CHAMBERLIN.

University of Pennsylvania, Philadelphia.

During several weeks in June and July of 1910 I had opportunity for making collections of chilopods in the district indicated by the title of this paper. Unfortunately, the season was unusually dry in these States, particularly in Michigan and Wisconsin, and, as a result, unfavourable for securing an abundance of material. The members of the Geophiloidea seemed especially difficult to uncover; but among the species obtained are several of exceptional interest, two representing new genera, for which it seems necessary to erect a new family. The families of the Geophiloidea now recognized as occurring in the United States, east of the Rocky Mts., may be separated as follows:

- a. Mandibles with a dentate lamella.
 - b. Mandibles with a single pectinate lamella; antennæ filiform or somewhat clavate..... Family *Schendylidæ*.
 - bb. Mandibles with several pectinate lamellæ; antennæ flattened, attenuated distad..... Family *Himantariidæ*.
- aa. Mandibles with no dentate lamella; with a single pectinate lamella.
 - b. Labrum fused for a short distance at middle; antennæ flattened, at least narrowly elliptic in cross-section, attenuated distad..... Family *Sogonidæ*.
 - bb. Labrum entirely free; antennæ cylindrical, filiform or a little clavate.
 - c. Median piece of labrum extending along and, at least in part, fused with the lateral; at middle of free edge with two much larger and more strongly chitinized teeth directed more or less ventrad..... Family *Soniphilidæ*, fam. nov.
 - cc. Three divisions of labrum distinct; without two such larger and ventrally-directed teeth..... Family *Geophilidæ*.

Of these families, representatives of the Geophilidæ and Soniphilidæ alone were secured in the region covered by this paper. However, the Schendylidæ is represented, *Escaryus urbicus* (Meinert), having been taken in Minnesota, and the same species having been found by the writer to be quite common in New York State. The family Himantariidæ is represented in Texas and Mississippi by a species of Haplophilus, and by at least one of the genus Gosiphilus, *G. laticeps* (Wood). These genera may be found to range into the present section. The family Sogonidæ is at present known to be distributed in Texas (*Timpina texana* Chamberlin, a form with but five joints to the anal legs), and in South Carolina and Tennessee (*Sogona minima* Chamberlin). On the Pacific Coast occur several families not found east of the Rockies.

Family Geophilidæ.

Subfamily Geophiliræ.

Genus Geophilus Leach.

Geophilus rubens Say.

Syn. *Geophilus cephalicus* Wood.

Geophilus lævis Wood.

Geophilus okolonæ Bollman.

Localities.—DeWitt, Mongona and Boone, Iowa; Franklin Grove, Ill.; Saunder's, Mich.

This is a very common species in Indiana, Ohio and more Eastern States. The form described by Bollman from Arkansas agrees perfectly with this species, excepting that the number of pairs of legs is higher than usual in northern specimens. This, however, is in line with a tendency shown by many other species for the number of legs to show an increase in going from the north to the south or from high elevations to low. It is one of the commonest forms in this district. California specimens also frequently have a larger number of legs.

Genus Arenophilus Chamberlin.

Arenophilus bipuncticeps (Wood).

Syn. *Geophilus attenuatus* Bollman (but not certainly of Say).

Geophilus georgianus and *latro* Meinert.

Schendyla perforata McNeill.

Localities.—Mongona, Boone, DeWitt, Tama, Marshalltown, Iowa; Fremont, Neb.; Peoria, Ill.; Janesville, Wis.

This is by far the most abundant species. It ranges as a common form through the greater part of the United States in and east of the

Mississippi Valley. At Mongona (June 22), and Marshalltown (June 24), Iowa, and at Sterling, Ill. (June 26), females were taken with recently-laid eggs.

Genus *Pachymerium* Koch.

Pachymerium ferrugineum Koch.

Syn. *Geophilus foveatus* (McNeill).

Localities.—DeWitt, Iowa ; Peoria, Ill.; Devil's Lake and Fond du Lac, Wisc.

At Fond du Lac (July 6), the species was found in great abundance among the stones at a river's edge, partly grown individuals being common, and a considerable number of females being found with bodies still coiled about their recently-hatched young.

This is a species widespread in the Eastern United States, as it is in Europe. The specimens secured are similar in size to Austrian specimens, most being under 25 mm. in length.

Subfamily Chilenophilinæ

Genus *Taiyuna* Chamberlin.

Taiyuna opita, sp. nov.

Proportionately robust; attenuated strongly caudad, and also decidedly but less strongly cephalad. Sparsely clothed throughout with long bristles.

Head with corners rounded; sides convexly curving; caudal margin straight; anterior margin extended forward from corners to middle, and a little incurved at median line; longer than wide in ratio, 19:16, and five times longer than exposed portion of basal plate. Prebasal plate absent. Basal plate overlapped in front by the cephalic, and behind by the first dorsal plate; free portion wider than median length in about ratio 34:7. Antennæ short; articles moderate and short, the ultimate equal in length to the two preceding taken together.

Claws of prehensorial feet when closed reaching the distal end of the first antennal article. Claw at base with a subcylindric, apically truncate, tooth; prefemur also with a strongly chitinized tooth at distal end; the intermediate joints also each with a distinct, conical and well-chitinized tooth. Prosternum unarmed; its anterior median margin nearly straight, not excised; chitinous lines not evident; suture parallel with margin; wider than long in ratio 39:35, longer than prefemur in ratio 7:4. Dorsum weakly bisulcate, also with a more median pair of fine sulci. Anterior præscuta short, being of moderate length in the middle region, and then

again shortening caudad. Spiracles all circular, the first greatly exceeding the second in size. First pair of legs much reduced; anterior pairs more robust than the caudal, not shorter. Anterior ventral plates with a rather weak median sulcus, most plates plane; pores not detected. Last ventral plate moderately wide; margins straight, the lateral moderately converging caudad. Coxopleuræ with about four pores in a row under edge of plate, and four or five free on the sides, well separated from each other. Anal legs longer and more crassate than the penult; without claws. Pairs of legs (in female) 41.

Length of female 15 mm.; width .9 mm.

Localities.—Posers and Kimball's, Mich.

Genus *Gnathomerium* Ribaut.

Gnathomerium umbraticum (McNeill).

Syn. *Gnathomerium americanum* Ribaut.

Locality.—Manitou, Colorado.

This seems to be a southern species, occurring widely and abundantly throughout the Southern States. In favourable seasons it may be found to be not rare in the present region, as Bollman reports it as common in Indiana.

Subfamily Linoteniinæ.

Genus *Linotenia* Koch.

Linotenia chionophila (Wood).

Localities.—Devil's Lake and Ashland, Wis.

Many specimens were taken at the former locality under leaves and stones about the margin of the lake. This species is boreal, being abundant, comparatively, in Alaska and adjacent islands. It was first described from specimens taken at Fort Simpson on the Red River of the North. It is very close to *Linotenia acuminata* (Leach) of Europe, and may have to be merged with it.

Linotenia fulva (Sager).

Localities.—Mongona, Boone, DeWitt and Marshalltown, Iowa; Franklin Grove, Ill.; Sterling, Ill.

Very much the commonest *Linotenia* in the Northern United States, and one of the commonest members of the entire order.

Family Soniphilidæ, fam. nov.

Genus *Soniphilus*, gen. nov.

Labrum free; the median part firmly fused to the lateral, at least at ends; edge of median portion directed ventrad and bearing a number of

very stout teeth, which extend directly ventrad (the figure accompanying suggests a bedding of these teeth somewhat caudad, which does not exist); of these teeth the two median are clearly largest, the others decreasing from median to outermost; lateral portions with edge bearing a few spinous processes much more weakly chitinized than the teeth of middle portion. (See pl. 1, fig. 3.) Mandibles with a single pectinate lamella; no dentate lamella. Both branches of first maxillæ set off by a suture; the outer branch biarticulate, entirely without lappets or with a single short, conical one on outer edge of base; coxæ completely fused at mesal line. Coxæ of second maxillæ fused at middle; palpi short, bearing a simple claw of normal size.

Chitinous lines of prosternum strongly developed. Prehensorial feet with joints all unarmed; claws when closed not attaining front margin of head. Frontal plate not discrete. Prebasal plate absent. At least the anterior sterna with caudal margin strongly chitinized in a sharp edge or blade-like form, which fits into a transverse groove in anterior margin of succeeding plate. (See fig. 5.) Pores not detected. Dorsal plates bisulcate. Last ventral plates very wide. Anal legs six-jointed, ending in claws.

Type.—*Soniphilus embius*, sp. nov.

Soniphilus secundus Chamb., a Californian species, also belongs here.

Soniphilus embius, sp. nov.

Slender, attenuated cephalad and caudad; body very sparsely provided with short straight hairs, the head with longer ones.

Yellowish-white, the anterior region more strongly yellow or lemon colored; head with prosternum and prehensorial feet pale reddish brown; antennæ yellowish white.

Head widest over caudal portion, the sides from middle caudad but very slightly converging, the sides in front of middle nearly straight and clearly converging; anterior margin with middle part straight, transverse, on each side a little oblique, extending a little caudad in running from middle to lateral cornea, straight. Frontal suture absent. Prebasal plate absent. Basal plate four times as wide as its median length, a little wider than cephalic plate (24:23). Antennæ filiform, of moderate length; articles longer than wide, decreasing in length distad to the penult, the ultimate about equal in length to the two preceding taken together.

Claws of prehensorial feet when closed not attaining the anterior margin of head, short, the inner free margin of prefemur very short or

almost obliterated ; claw within a very small conical tooth at base, other articles unarmed. Prosternum with chitinous lines well developed ; two submedian longitudinal sulci ; anterior margin unarmed, weakly angularly depressed from sides to median line ; much wider than long (14:9), longer than greatest length of prefemur nearly in ratio 9:5. Dorsum weakly bisulcate. Prescuta of middle region moderate or short, not much decreasing in length cephalad and caudad. Spiracles all circular, relatively large, the first considerably larger than the second, the others gradually decreasing from the second caudad. Legs of first pair decidedly shorter and more slender than the second. Ventral pores not detected. Plates of anterior portion of body with a transverse groove along cephalic edge, which is protected by a flange-like extension on the ventral side ; into this groove fits the well-chitinized, extended blade-like caudal edge of the preceding plate in each case. Last ventral plate very wide, strongly narrowed caudad, the lateral margins a little incised below middle ; caudal margin straight. Coxo-pleuræ each with a single free isolated pore of small size, and two larger pits covered by the edge of the plate. (See fig. 4.) Anal legs longer and slightly stouter than the penult (female). Pairs of legs (female) 43.

Length, 13 mm.

Localities.—DeWitt, Iowa.

The type is a single female, which was taken with her recently-laid eggs.

Genus *Poaphilus*, gen. nov.

Agreeing in general with *Soniphilus*, as described above, but readily distinguished in having the joints of the prehensorial feet dentate within and its claws extending much beyond the front margin of the head. The last ventral plate is narrow or but moderate in width, not very wide, as in the preceding genus.

Type.—*Poaphilus kewinus*, sp. nov.

Aside from the species here described, a second one from New Mexico is also known.

Poaphilus kewinus, sp. nov.

Body very small, strongly attenuated cephalad and caudad.

Antennæ and legs pale yellow ; body light yellowish brown ; head with prosternum and prehensorial feet light reddish brown.

Head much longer than wide (11:8) ; ten or eleven times as long as the very short basal plate ; relatively narrow, leaving sides of prehensorial

feet exposed for entire length ; caudal margin truncate, sides weakly bowed outward from end to end, the anterior margin rounded on each side, mesally incised. Frontal plate not discrete. Prebasal plate absent. Basal plate greatly abbreviated, the exposed portion eight times as wide as long.

Antennæ filiform, as compared with body length rather long ; articles moderately long, decreasing distad, the ultimate a little longer than the two preceding together ; bristles very long, distad, becoming shorter and denser as usual.

Claws of prehensorial feet when closed attaining distal end of first antennal article ; claw armed at base with an acute conical tooth, prefemur with a low, conical and subdentiform protrusion on mesal surface, other joints unarmed. Prosternum wider than long in ratio 20:17 ; longer than the prefemur in the ratio 17:10, nearly ; chitinous lines distinct. Dorsal plates bisulcate ; also with a weak median sulcus. All prescuta short. All spiracles circular, the first larger than the second. First pair of legs shorter and much more slender than the second ; anterior pairs shorter and thicker than those of posterior portion of body. Last ventral plate moderately wide, narrowed caudad, the margins nearly straight, the caudal slightly excised. Coxopleural pores four, small, two of these covered or partly covered by the edge of the last ventral plate and the other two free. Anal legs longer and thicker than the penult, ending in a long slender claw. Pairs of legs in female, 37.

Length, 6.5 mm.

Locality.—Marshalltown, Iowa.

The type, as with the preceding species, is a single female which was taken—her eggs were very few in number.

EXPLANATION OF PLATE.

Soniophilus embius, gen. et sp. nov.

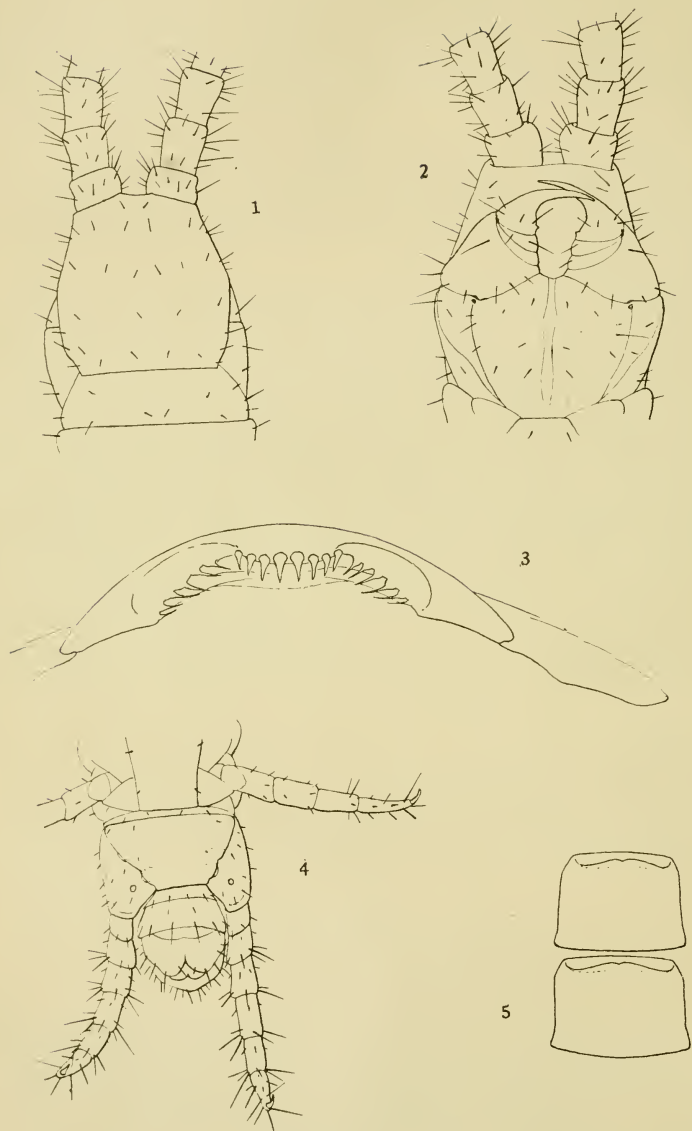
Fig. 1.—Dorsal view of anterior portion.

Fig. 2.—Ventral view of anterior portion.

Fig. 3.—Labrum, ventral aspect. (The teeth of median portion normally extend directly ventrad ; the figure shows them extending caudo-ventrad, this resulting from depression by the cover-glass).

Fig. 4.—Ventral view of posterior portion.

Fig. 5.—Ninth and tenth ventral plates.



SONIPHILUS EMBIUS, GEN. ET SP. NOV.

THE LIGHT-EMISSION OF AMERICAN LAMPYRIDÆ: NOTES
AND CORRECTIONS ON FORMER PAPERS.

BY F. ALEX. MCDERMOTT, WASHINGTON, D. C.

The author wishes to make the following corrections in and additions to his former papers on "The Light-Emission of American Lampyridæ" in this journal:

Vol. 42 (1910), p. 360.—Modify lines 13 to 9 from bottom to read:

"The *consanguineus* emits two such flashes, separated by an interval of about a second, followed by a longer interval before the next two; sometimes the double flash is followed by a residual phosphorescence, as in *pyralis*. The *angulata* usually emits a single flash, much shorter and more sudden than that of *pyralis*, being in this regard like that of *scintillans*, but more greenish in colour than the light of the latter insect." (The twinkling light ascribed to *angulata* was no doubt that of a male *Lecontea lucifera* Melsh., its somewhat larger and very similar relative.)

P. 363.—Delete note at foot of page, as this paper proved to have no bearing on the immediate subject.

Vol. 43 (1911), p. 404.—After line 4, *Photuris* has been observed mating only rarely; upon one occasion a pair of these insects were observed to meet when flying low in almost directly opposite directions, and to alight on the ground and couple; this occurred in a little patch of woods where there were very few other fireflies of any species near. Both were flashing rapidly as they flew toward each other.

P. 405, line 17 from bottom, after "p. 142."—Rennie (Insect Miscellanies, Lond., 1831, pp. 222-232) cites some observations on *Lampyris noctiluca*, which, however, are on the whole opposed to the theory of the sexual significance of the photogenicity.

Line 11 from bottom.—Olivier (Compt. Rend. Assn. Fr. Av. Sci., 1909, Sess. 37, pp. 573-580; 1er. Cong. Internat. d'Entomol., Brux., Aug., 1910, pp. 273-382), has also made some observations along the same line as Gorham.

Line 4 from bottom.—For "Avesbury" read "Avebury." (Sir John Lubbock.)

Rennie (supra) also notes the tendency of *Lampyris noctiluca* ♂ to fly into lighted rooms.

P. 406, line 8.—Before "light" insert "ordinary."

NOTES ON THE CHALCIDOID *TRICHAPORUS* FOERSTER
OF THE FAMILY EULOPHIDÆ, WITH DESCRIPTION
OF ONE NEW NORTH AMERICAN
FORM FROM ILLINOIS.

BY A. ARSENE GIRAULT, BRISBANE, AUSTRALIA.

(Continued from page 52.)

Family Eulophidæ.

Subfamily Tetrastichinæ.

Tribe Tetrastichini.

Trichaporus Foerster, novum Ashmead, 1904.

(Type: *Trichaporus melleus* Ashmead.)

1. *Trichaporus melleus* Ashmead.

Ashmead, 1904, p. 512.

"*Trichoporus melleus*, sp. nov.

"Female: Length, 1.8 mm. Honey yellow, punctate, the eyes brown, the abdomen with a blackish spot on each side near the middle, the scape and legs pale yellowish; flagellum long, filiform, hairy; wings hyaline, the veins pale yellowish. The abdomen is cylindrical, pointed at apex, and as long as the head and thorax united.

"Male: Length, 1.4 mm. Agrees in colour with the female except that the blackish spots near the middle of the abdomen unite and form a transverse band, while the veins in the front wings are brownish. The flagellum is long, and the hairs are much longer than in the female.

"Brazil: Santarem; Chapada."

Type in the Carnegie Museum, Pittsburgh, Pennsylvania.

2. *Trichaporus viridicyaneus* Ashmead.

Ashmead, 1904, p. 512.

"*Trichoporus viridicyaneus*, sp. nov.

"Female: Length, 2-2.6 mm. Metallic bluish green to blue, punctate; scape, trochanters, apices of all femora, and all tibiæ and tarsi, except the last joint, pale yellowish; flagellum brownish yellow, pubescent; wings hyaline, the veins yellowish. The abdomen is long, cylindrical, twice as long as the thorax, pubescent, the first and second body segments about equal, shorter than the third, the first segment longer than the third, the sixth and seventh short, the seventh conical.

"Male: Length, 1.4-1.5 mm. Agrees well with the female, except in the usual sexual differences and in a slight difference in the colour of the antennæ and legs. The flagellum is darker, with longer hairs, and with only *one* ring-joint, while the front and middle femora are dusky only

at base. The abdomen is cylindrical, a little longer than the head and thorax united.

"Brazil : Chapada, in April. Fourteen females, six male specimens."

Types in the Carnegie Museum, Pittsburgh, Pennsylvania.

3. *Trichoporus persimilis* Ashmead.

Ashmead, 1904, p. 512.

"*Trichoporus persimilis*, sp. nov.

"Female: Length, 2.8 mm. Metallic brown-black, punctate, the abdomen brown beneath; flagellum brown, hairy; scape, pedicel and legs, including the coxæ, honey yellow, the femora more or less dusky or brownish, especially basally; otherwise it is very similar to *T. viridicyaneus* except that the first body segment of the abdomen is twice the length of the second.

"Brazil: Chapada, in April. Two specimens."

Types in the Carnegie Museum, Pittsburgh, Pennsylvania.

4. *Trichoporus aneoviridis*, species nova.

Normal position.

Female: Length, 1.8 mm. Average, moderate for the family.

General colour bright metallic green, with a brassy sheen, the scutellum with a purplish hue in certain lights. Legs pallid yellow, including the apices of the coxæ; tips of apical tarsal joints dusky; antennæ dark, indefinite in colour, the scape paler yellowish, the pedicel and ring-joint slightly paler; venation indefinite, dusky yellowish. Eyes and ocelli dark garnet, the latter moderately large, in a flat isosceles triangle on the vertex, the distance between each about the same as the distance between each lateral ocellus and the margin of the eye.

Head (cephalic aspect) bilobed, longer than wide (dorsal aspect), as wide as the greatest width of the thorax, five times wider than long (cephalo-caudad), squamosely reticulated, the cephalic ocellus at the extreme median apex of the vertex (cephalad), one-third wider across the eyes (cephalo-caudad) than at the median line of the vertex, which is narrowed. Eyes ovate, half the length of the genæ, their surface much rougher than that of the head. Antennæ inserted below (ventrad) the middle of the face, slightly above (dorsad) the ventral ends of the eyes. Genal sulcus broad, distinct.

Mesothorax, including axillæ, scutum, scutellum and parapsides, strongly shagreened, or squamosely reticulated, the pleura less so, polygonally sculptured; dorsum of the metathorax roughly reticulated, or punctate, the median carina moderately strong. Abdomen closely,

squamosely reticulated. Scutellum with four conspicuous longitudinal furrows, two on each side of the meson, the lateral ones barely visible from the direct dorsal aspect and at the lateral margin of the sclerite in the dorso-lateral aspect. Parapsidal furrows conspicuous, deep; mesoscutum with a slight carina along the median line. Abdomen ovate, the segments subequal, segment 2 longest, 3 shorter than 4, 5 and 6, widest at segment 4, and about equal in length to the head and thorax combined; caudal margins of the segments straight, or slightly concaved at the meson. Tarsi 4-jointed.

Fore wings hyaline, the marginal fringes short, the discal cilia uniform; postmarginal vein absent, the marginal vein about a fourth longer than the submarginal, the latter broken. Hind wings uniformly ciliate discally. Stigmal vein of fore wings moderate in length, clavate, and with an uncus.

Antennæ 9-jointed; scape about equal in length to the pedicel and first funicle joint combined, inserted not much below the middle of the face; pedicel subconic, over one-third shorter than funicle joint 1; ring-joint inconspicuous but evident; funicle joints 1 and 3 subequal, cylindrical oval, funicle 2 slightly longer, nearly twice the length of the pedicel; the three club joints decreasing in size, the basal joint longer than the pedicel, nearly a third shorter than funicle 3 and a fourth longer than joint 2 of the club; the apical joint conical, smaller than the pedicel, and ending in a short spine-like projection. Antennæ bearing stiff curved bristles, the flagellum longitudinally carinate. Ovipositor not exerted. Mandibles fuscous, tridentate, symmetrical, the outer and next tooth conspicuous, the inner or third tooth one-half shorter than the second, barely defined, its inner (nasal) margin obliquely concaved.

From 33 specimens, $\frac{2}{3}$ -inch objective, 1-inch optic, Bausch and Lomb.

Male.—Length 1.5 mm., smaller, more slender. The same. Abdomen cylindrical; antennæ slightly lighter in colour, more hairy, the setæ longer, 10-jointed, the same, but the funicle 4-jointed, the first joint distinctly smaller than the others, the ring-joint minute, subobsolete, and the two basal joints of the club subequal in length; funicle joints 2 and 3 equal, longer than 4. Mandibles the same.

From 4 specimens, the same magnification.

Described from four males, thirty-five females, reared in the insectary of the State Entomologist, Urbana, Illinois, May 27, 1908, from, supposedly, a single larva of *Malacosoma americana* (Harris) on apple twigs. On May 18 this supposed lasiocampid larva was dissected and found to

contain the pupæ of this species, which emerged as adults on the date mentioned. The host was one of several larvæ sent to the insectary, together with several incidental puparia of a species of *Syrphus*, all of them, with this single exception, being parasitized by a solitary Ichneumonoid. The nature of its parasitism is, therefore, unknown, the host being either a dipteran of the family Syrphidæ, a hymenopteron of the family Ichneumonidæ or the lasiocampid. It is apparently a primary parasite of the latter.

It differs from all other species in the genus in being comparatively smooth, the head, thorax and abdomen squamosely reticulated, not punctate, agreeing somewhat in this respect with *Syntomosphyrum*, Foerster.

Habitat.—Centralia, Illinois (L. M. Smith).

Type.—Accession No. 37,543, Illinois State Laboratory of Natural History, Urbana, Illinois, 3 females, tag-mounted, female antenna in xylol-balsam (1 slide). Cotype No. 12,200, United States National Museum, Washington, D. C., 2 females on tags.

5. *Trichaporus colliguayæ* (Philippi).

Exurus colliguayæ Philippi, 1873, pp. 296–298, taf. 1, figs. 1, 1a, 1e.

Exurus colliguayæ Philippi, de Dalla Torre, 1898, p. 159.

Trichaporus colliguaya (Philippi), Ashmead, 1904, p. 512.

“1. *Gallen des Colliguai*. Taf. 1, fig. 1a-e.

“Man sieht sehr häufig Gallen am untern Theil der Kätzchen des Colliguai, *Colliguaya odorifera* Molina, eines Strauches aus der Familie der Euphorbiaceen, der in den mittleren Provinzen Chile's gemein ist, und dessen Holz beim Brennen angenehm riecht. Fig. 1 zeigt eine solche Galle in natürlicher Grösse. Die unteren zwei Drittel der Axe des Kätzchens sind gewaltig aufgetrieben, im Gestalt einer länglich eiförmigen, etwas unregelmässigen Knolle, und tragen auf ihrer Oberfläche noch die schuppenartigen Deckblätter, auf denen die Staubgefässe entspringen, welche mehr oder weniger vollständig entwickelt sind. Schneidet man die Galle durch, so sieht man im Innern derselben eine unregelmässige, von 2–3 mill. dicken Wänden eingeschlossene Höhle, in welcher zahlreiche Maden sitzen. Im Anfang sind die Gallen gelbgrün, später mehr roth, zuletzt, wenn sie beginnen trocken zu werden, braun. Sie sind von mässiger Consistenz, und milchen beim Durchschneiden weniger als die übrigen Theile der Pflanze. Die Maden zeigen nichts Auffallendes; man sieht deutlich mit dem Kopf dreizehn Ringe; sie zeigen keine Spur von Füßen und Augen, etc. Ich sammelte eine Menge dieser Gallen, und

that sie in ein grosses Einmacheglas, um zu sehen, was sich daraus entwickeln würde, vergass aber über andern Geschäften meine Gallen, bis ich nach längerer Zeit in dem Glase viele hundert kleine Pteromalinen, so wie ein Paar grössere einer zweiten Art, aber kein einziges Exemplar einer Gallwespe oder Fliege fand. Ich muss daher glauben, dass die erst erwähnte Pteromaline die Gallen hervorbringt, und die zweite im Larvenzustand die Maden der ersten auffrisst.

“Die Gallen bildende Pteromaline scheint mir ein besonderes Genus bilden zu müssen, und ich habe sie *Exurus Collignayæ* genannt (ξευρός “was einen Schwanz bildet, spitz zulauft). Der Körper ist 3 mill. lang, die Flügelgespannung beträgt 7 mill. Das vollkommene Insekt ist ganz schwarz und glänzend, bis auf die untere Hälfte der Schenkel, die Schienen und Tarsen, welche schalgelb sind. Der Kopf ist quer; seine drei Punktaugen liegen in einer graden Linie zwischen* den Netzaugen, wie man deutlich an der Puppe wahrnimmt, da deren Körper heller gefärbt ist; am vollkommenen Insekt sind sie schwer zu sehen. Die Fühler entspringen in der Höhe des untern Augenrandes, sind gekniet und nur so lang, das sie, zurückgeschlagen, bis etwas über den Ursprung der Flügel reichen würden, und sind nach dem Geschlecht verschieden, beim Männchen nämlich federbuschartig lang behaart und siebengliedrig, beim Weibchen sehr kurz behaart und sechsgliedrig. Das erste Glied ist keulenförmig und ziemlich dick; es reicht bis an den Scheitel und ist auf der Oberseite schwach behaart, sonst kahl; das zweite Glied ist verkehrt kegelförmig und etwa ein Drittel so lang; das dritte Glied ist beim Männchen an der Basis verdickt, zwei Drittel so lang wie das erste, und ähnlich ist das vierte, fünfte und sechste, nur nimmt ihre Dicke allmählich ab; das siebente ist etwas länger als das vorhergehende, im ganzen walzenförmig, in der Mitte etwas dicker. Das dritte, vierte, fünfte, sechste Glied haben am Grunde einen Wirtel längerer Haare, das siebente ist überall gleichmässig und ziemlich lang behaart. Beim Weibchen sind die beiden ersten Glieder der Fühler ziemlich wie beim Männchen, aber alle folgenden sind walzenförmig und überall gleichmässig behaart; das dritte Glied scheint aus der Verschmelzung von zwei Gliedern entstanden zu sein. Mundtheile habe ich am vollkommenen Insekt nicht bemerkt, obgleich ich an der Puppe an der Stelle zwei braune Punkte gesehen habe, die ich für die Mandibeln halten möchte.

“Der Hinterleib ist nicht gestielt, verlängert, allmählich zugespitzt, und ist die Spitze beim Weibchen länger; er ist auf der Bauchseite gekielt

*Beginning p. 297.

auf dem Rücken (wenigstens bei trocknen Exemplaren) concav, mit anliegenden, kurzen Härchen bekleidet, aber doch sehr glänzend, so dass man nur schwer erkennen kann, dass er aus sieben Gliedern besteht; an der Puppe ist dies leichter. Die Brust ist fast ganz kahl; der Rücken der Vorderbrust ist klein, kaum so lang wie der Kopf; die Mittelbrust ist ziemlich gross; das Schildchen deutlich, sonst durch nichts ausgezeichnet; die Hinterbrust sanft abschussig. Die Vorderflügel sind dadurch ausgezeichnet, dass der erste und einzige Nerv den Vorderrand selbst bildet bis zu zwei Dritteln der Länge, wo er einen stielförmigen Ast nach hinten und aussen schickt. Die Hinterflügel haben an der Basis keinen Lappen. Die Beine sind lang und schlank, durch nichts Besonderes ausgezeichnet. Die Hüfte ist ziemlich dick; es sind zwei kleine Trochanter vorhanden; der Schenkel ist schlank, in der Mitte mässig verdickt, schwach und kurz behaart; die Schiene ist ziemlich walzenförmig,[†] und trägt am Ende einen kurzen Dorn. Die Tarsen sind kürzer als die Schienen, bedeutend dünner, walzenförmig; die einzelnen Glieder sind schwer zu unterscheiden; es sind ihrer fünf; das erste Glied ist das längste, das vierte und fünfte sind zusammen kaum länger als das dritte. Sehr lang sind die beiden Haftenlappen, fast länger als das fünfte Glied, während die Klauen sehr klein sind, nämlich kaum halb so lang wie das fünfte Glied dick ist.

“Da ich mich sehr wenig mit dem Studium der Hymenopteren, namentlich der kleineren, beschäftigt habe, so muss ich es anderen Entomologen überlassen, zu entscheiden, welches die genauere Stellung dieses Insektes im System ist; in den wenigen, einschlägigen Büchern, die mir zu Gebote stehen, habe ich, wie gesagt, kein Genus finden können, in welches ich dasselbe hätte einordnen können.

“In der Abbildung auf Taf. 1 ist fig. 1d eine Galle, von aussen gesehen; fig. 1e dieselbe aufgeschnitten; 1 das weibliche Insekt, vergrössert; die darunter stehenden Linien geben die Grösse an; 1a ist ein stark vergrösserter Fühler des Männchens, 1b des Weibchens, 1c der Tarsus.” Pp. 296-298.

The form of this species, as shown in the figure, is similar in general to that of *Trichaporus*, but the tarsi are 5-jointed, the antenna 6-jointed in the female, the scutellum small and apparently without grooves, the parapsidal furrows apparently absent, the body not punctate, and other characters, which make its present position questionable. I think, however, that Ashmead has placed it as well as circumstances allow. I

[†]Beginning p. 298.

do not know of existing specimens, but there are probably some in the Naturhistorische Museum, St. Yago, Chile.

6. *Trichaporus columbianus* (Ashmead).

Euderus columbiana Ashmead, 1888, pp. 104-105.

Euderus columbianus Ashmead, de Dalla Torre, 1888, p. 6.

Trichoporus columbianus Ashmead, 1900, p. 561.

"*Euderus* Haliday.

"(14) *Euderus columbiana*, n. sp.

"♀. Length, 10 inch. Dull brown, or bronzy-green, its whole surface, including the abdomen, strongly, confluent punctate. Head transverse, not wider than the posterior part of the mesothorax, and with only a slight antennal groove in front. Antennæ about as long as the thorax,† eight-jointed; scape slender, yellowish brown; flagellum dark brown, about twice as long as the scape, pubescent, the pedicel shorter than the funicle joint, the latter joint the longest, about twice as long as wide, the following joints being not much longer than wide, sub-moniliform. Thorax: collar transverse, rounded before; mesothorax with parapsidal grooves well defined; scutellum longer than wide, without grooves, rounded behind, sides parallel. Abdomen conic-ovate, cylindric, one-third longer than head and thorax together, the segments of nearly equal length. Legs dark brown, trochanters, knees, fore and middle tibiæ, and all the tarsi honey-yellow, hind tibiæ dusky in the middle. Wings hyaline, fringed with short ciliæ; the veins brown, the marginal is twice the length of the submarginal, the stigmal short, while the postmarginal is wanting.

"Hab.—Florida and District of Columbia."

I have been unable to connect, directly, *Euderus columbianus* Ashmead with *Trichaporus columbianus* Ashmead listed in Smith's (1900) Catalogue of the Insects of New Jersey, but as I cannot, in addition, find the original description of the latter, conclude that they are synonymic and that Ashmead intended the former species.

In characters, the species does not agree with either genus (*Euderus* Haliday or *Trichaporus*), as now limited (but does with the definition of Foerster, 1856), and can hardly belong to the Tetrastichini as limited by Ashmead (1904), the scutellum having no grooves. From the description of the species quoted in foregoing, being an eulophid with a long marginal vein, short submarginal and stigmal veins, without a postmarginal vein and grooves on the scutellum, with 8-jointed antennæ and complete parapsidal

†Ending p. 104.

furrows (implied) sessile abdomen, the species falls near the omphalinine genus, *Closterocerus* Westwood. As I have not seen the species, however, I think that Ashmead's later determination should be accepted for the present, and so I have included it here.*

Smith (1900), gives the following note concerning this species: "Lives in Cecidomyid galls, widely distributed (Ashm.)." The species occurs in Florida, District of Columbia and New Jersey.

The types are probably in the United States National Museum, Washington, D. C.

Table of Species.

This table is constructed from the literature, and caution should therefore be exercised in identifying species by its aid alone. It forms merely an index to the species included within the group.

Females.

A. Species metallic bronze-greenish to bluish or brownish.

a. Dull brown or bronzy-green, confluent punctate.

Flagellum dark brown; scutellum without grooves; legs dark brown and honey-yellow.....*columbianus* (Ashmead).

b. Metallic brown-black.

Flagellum brown; scutellum with grooves; legs and coxæ honey-yellow, with some brownish on femora...*persimilis* Ashmead.

c. Metallic blue-green, punctate.

Flagellum brown-yellow; scutellum with grooves; tibiæ and tarsi pallid yellow, femora and coxæ green.....*viridicyaneus* Ashmead.

d. Metallic, shining, bright green, brassy, squamosely reticulated.

Flagellum dusky, neutral; scutellum with four grooved lines; legs uniformly pallid yellow, the coxæ metallic green.....*æneoviridis* Girault.

B. Species shining black.

a. Flagellum black; legs yellow and black; scutellum without grooves...*colliguayæ* (Philippi).

C. Species honey-yellow.

a. Flagellum yellow; punctate; legs pallid yellow...*melleus* Ashmead.

D. Species bright metallic green, brassy; squamosely reticulated.

a. Metathorax punctate; scutellum with four grooved lines; legs

*It may be that *Trichaporus* Foerster, with Ashmead's *columbianus* as type, could be resurrected, while the group of Ashmeadian species now forming the genus, as here proposed, including the new species, could be renamed.

pallid yellow, the coxæ metallic green; flagellum dusky, the scape and pedicel paler.....*æneoviridis* Girault.

Literature referred to.

1856. Foerster, Arnold.—Hymenopterologische Studien, Aachen, II, pp. 83, 84, 85.

1866. Taschenberg, E. L.—Die Hymenopteren Deutschlands nach ihren Gattungen und theilweise nach ihren Arten als Wegweiser für angehende Hymenopterologen, *etc.* Leipzig, p. 109.

Trichaporus Foerster.—Date of publication not given; preface dated August, 1865, Halle.

1867. Kirchner, Leopold—Catalogus hymenopterorum europæ, Vindobonæ, p. 186, No. 700.

“700.—G. *Trichaporus* Förster, Hym. Stud. II 85. 1, Tr. Sp.?”

1872. Walker, Francis.—Notes on Chalcididæ, London, Part VI, pp. 104-105.

Translation of Foerster (1856).

1873. Philippi, Rudolph Amandus.—Chilenische Insekten beschrieben von Dr. R. A. Philippi. (Stettinger) Entomologischer Zeitung. (Herausgegeben von dem entomologischen Vereine zu Stettin), Stettin, XXXIV, pp. 296-298, Taf. I, figs. 1, 1a—1e.

1888. Ashmead, William Harris.—Descriptions of some new North American Chalcididæ. CAN. ENT., London, Ontario, XX, pp. 104-105.

1898. De Dalla Torre, Carl G.—Catalogus Hymenopterorum hujusque descriptorum systematicus et synonymicus, Lipsiæ, V, pp. 27, 159.

1900. Ashmead, William Harris, in John Bernhard Smith.—Insects of New Jersey. A list of species occurring in New Jersey, *etc.* Supplement, 27th Annual Rep. State Board of Agr., Trenton, p. 561.

Trichoporus columbianus Ashmead.

1900. Smith, John Bernhard.—*Vide* Ashmead, 1900.

1904. Ashmead, William Harris.—Classification of the Chalcid flies or the superfamily Chalcidoidea, with descriptions of new species, *etc.* Memoirs of the Carnegie Museum, Pittsburgh, Pennsylvania, I, No. 4 (Publications of the Carnegie Museum, Serial No. 21), pp. 348-350, 392, 512.

1907. Scheniedéknecht, Otto.—Die Hymenopteren Mitteleuropas, *etc.*, Jena, pp. 489, 490.

Same as Ashmead (1904); table of genera.

1909. Idem.—Genera Insectorum (dirigés par P. Wytsman), Bruxelles, 97 me fascicule, Family Chalcididæ. pp. 427, 464, 465, 468.

Table to the genus as in Ashmead (1904); brief diagnosis of the genus, listing *colliguayæ*, *melleus*, *persimilis* and *viridicyaneus*, *Euderus columbianus* (p. 427).

(See also Kieffer, bionomic note on *colliguayæ*, Révista Chilena de Historia Natural. Órgano del Museo de Valpaíso, VII, p. 111.)

NEW AFRICAN *TIPULIDÆ*.

BY C. P. ALEXANDER, ITHACA, N. Y.

The following species were given by Mr. Chas. W. Howard to Prof. Needham, and later turned over to me for examination. There were four specimens, representing three species, of which two are herein characterized as new. Mr. Howard's remark, that "the species were as thick as gnats," is interesting.

Styringomyia howardi, n. sp.

Holotype.—♂, brown and gray; length, 5.25 mm.; width, 4.75 mm.

Mouthparts dark brownish black; palpi, first segment very short; second segment large, oval, brown, apical third black; third more slender, brown, apical two-thirds black; terminal segment about as thick as the penultimate. Antennæ: first segment elongated, gray; second oval, enlarged at the distal end, remaining segments oval, gradually becoming more elongated to the tip; segments with a short pubescence and long irregular hairs, which are scarcely verticillate; first segment gray, second dark brown at tip, yellowish at base; remaining segments pale brownish yellow, the hairs darker; ommatidia large, coarse, black; front, vertex, genæ and occiput gray, with stout, scattered black bristles.

Pronotum large and prominent, showing an unusually generalized condition; the scutellum U-shaped, encircling the cephalic margin of the mesothoracic præscutum, with about three prominent bristles on the lateral margin; the scutum is narrower, running to an obtuse point cephalad, with a group of bristles along the lateral margin. Mesonotum: præscutum with a row of bristles along each side of the median line and a row along the lateral margin, this row incurving near the cephalic margin of the sclerite; scutum with four bristles on each half; the scutellum with a bristle on either side of the median line; postscutum and metanotum unarmed. Pronotum brown, pale apically, with an inverted U-shaped pale mark on the scutum; mesonotum præscutum, middle line pale, remainder

March, 1912

brown; scutum grayish brown, yellow along the cephalic margin passing around the black bristle; scutellum yellow medially, brown laterad of the bristle, postscutum brown; metanotum brown; sterna yellow; epimera and episterna reddish brown, forming a narrow longitudinal band.

Halteres pale brown, subapically darker brown; tip yellow. Legs short and stout, thickly covered with appressed hairs; coxæ short, cylindrical, in the fore leg about as long as the trochanter; in the middle leg shorter than the prominent trochanter; in the hind leg prominent, much exceeding the shorter and narrower trochanter. Femora rather short, slender proximally, soon thickening so as to become almost clavate distally; the fore femora have stout, long hairs, which are scattered irregularly amongst the appressed hairs, becoming very numerous near the apical portion of the lower surface of the segment. Tibiæ slender throughout, tibiæ and metatarsi with a few prominent hairs regularly disposed; the other tarsal segments with a single hair at the tip. The fore femora are as long as the succeeding segments combined; the hind legs are longer than the others. Fore legs lacking (in the holotype); middle leg, coxæ and trochanter light yellow; femora yellow, with a medial and subapical brown band; tibiæ yellow, with a dark band before the middle and at the tip; tarsi yellow-tipped with dark brown; fifth segment and claws dark brown. Hind legs, coxæ, trochanters and femora as in the fore leg; tibiæ and tarsi yellow, excepting the last tarsal segment, which is darker.

Abdomen with numerous scattered hairs, yellow; the apical margins of the segments brown.

Wings with a faint yellow tinge; costal border and radial veins yellow; remaining veins darker; a dark suffusion around cross-vein $r-m$, at the union of M_3 with M_{1+2} and along the basal deflection of Cu_1 . Venation (see fig. 2): S_c short, approximated with R basally; its tip opposite the origin of R_s ; R short, the tip of R_1 before the middle of the

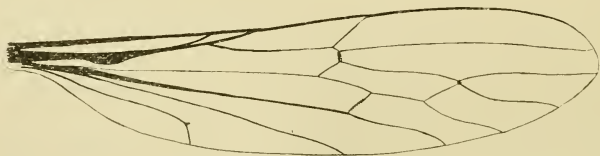


FIG. 2.—*Styringomyia howardi*, holotype.

wing, the sector originating a short distance back from the tip; R_s straight, rather long; R_{2+3} very short, oblique; deflection of R_{4+5} very short, scarcely equal to the $r-m$ cross-vein; R_{4+5} long. M forks anterior to the

fork of R_s ; deflection of M_{1+2} rather long; M_3 in a line with M , strongly deflected cephalad toward M_{1+2} , nearly, if not quite, obliterating the cross-vein m . Basal deflection of Cu_1 under the middle of cell 1st M_2 . First anal fused with Cu at extreme base; 2nd anal strongly curved at tip with a spur at the curve, which may be a remnant of a forked anal.

Paratype.—♂. This specimen is much darker than the type; the first six antennal segments are dark, remainder yellowish; thoracic dorsum dark brown, where it is light brown in the type; yellow of abdomen replaced by dark brownish gray, etc. This is but an extreme in colour.

This species is remarkably similar to the species mentioned by Osten Sacken (Mon. Dipt. N. Am., IV, p. 102, 103). The main differences are in the venation, the elongated cell 1st M_2 and incurved second anal with a spur at the curve being peculiar to *S. howardi*.

Holotype.—♂, Queliniani, Zambesi R., Dec. 20, '08; coll. Mr. C. W. Howard.

Paratype.—♂, with the type.

The only species described from Africa is *S. cornigera* Speiser (Dipt. aus Deutschland Afrikanischen Kolonien, p. 130-132, fig. 1*). This insect differs so remarkably from the remaining species of the genus, which otherwise form a homogenous compact group, that I propose to set it off in a new subgenus.

Neostyringomyia, subgen. n.

Char.—Radius long, its tip beyond the middle of the wing; R_s remarkably shortened, no longer than the $r-m$ cross-vein; R_{2+3} sinuate, leaving cell R_1 very different in shape from that which obtains in the subgenus *Styringomyia*; cross-vein m long and prominent; basal fusion of Cu and 1st A very long; prothorax narrow, scarcely one-fourth as wide as the head; above the antennæ a short, bent spatulate horn.

Type.—*S. cornigera*, Speis.

Cornigera is obviously of more recent derivation than the members of the subgenus *Styringomyia*, and its venation is almost normal; the retreat of R_{2+3} toward the base of the wing may give a hint to the manner in which the remarkable venation of *Toxorhina* came about, perhaps by the fusion of R_{2+3} with some other vein, such as R_1 .

A species was described from the Pacific Islands by Grimshaw in 1901, as *S. didyma* (Fauna hawaiiensis, Vol. 3, pt. 1 (Dipt.), pl. 1, figs. 14-16), from Honolulu, Oahu De Meijere, in his recent paper, "Studien

*Berl. Ent. Zeitschr., 52 (1907).

uber Süd-ostasiat. Dipteren, V,"† records the species from much farther west (Batavia, Java, etc.). *Styringomyia didyma* belongs to the typical subgenus, and is extremely similar to the fossil species described by Löew** and Osten Sacken, as well as to the species under consideration. All of the species of the subgenus *Styringomyia*, as here limited, are very similar to one another in venation, and the coloration is inclined to be variable. *S. didyma* differs from the new species as follows: The wings are shorter in *didyma*; R_{4+5} is in a direct line with R_s , whereas there is a deflection at the origin of R_{4+5} in *S. howardi*. *Didyma* has no spur at the curve of 2nd anal. The coloration of the thorax of the two species is different. The male genitalia of the species have not been studied critically, and must furnish the ultimate criterion. It is, of course, possible that when further collections are made, intermediate stations for the genus will be discovered, and then it may be proved that *S. howardi* is merely a variant of *S. didyma*. However, I prefer to describe it as distinct at present.

In the end of Vol. III of the Monograph, p. VII, Osten Sacken came forward with the surprising intelligence that the genus *Styringomyia* still existed. He says: "During my passage through Stockholm in 1872, I made the interesting discovery that the genus, besides its occurrence in amber and copal, is found living in Africa. I saw several specimens among the unnamed Diptera from Caffraria (from Wahlberg's voyage) in the Stockholm Museum. The species was apparently different from that included in the copal, which I possess." Later, in "Studies on Tipulidæ,"* he states, "This singular genus, originally described from specimens included in copal from Zanzibar, and also in amber, has been discovered since as still living in South Africa. In the museum in Stockholm I have seen recent specimens brought from Caffraria by Wahlberg."

Despite Prof. Speiser's statement (l.c., p. 132), that Osten Sacken probably referred to *Elephantomyia wahlbergi* Bergr., when he made the last-quoted statement, I have no doubt but that Osten Sacken saw specimens of a true *Styringomyia* in Stockholm; an error of this calibre was not customary with Osten Sacken.

Mongoma zambesiæ, n. sp.

Holotype.—♀, brown; length, 5.75 mm.; width, 5.5 mm.

Rostrum and palpi dark brown; antennæ, first two segments dark

†Tijdschr. voor Entomol., April, 1911, p. 40.

**Löew, H. Dipterol Beiträge, I, p. 7, with f. (1847).

*Berl. Ent. Zeitschr., Bd. XXXI, 1887; Heft., II, pp. 185, 186.

brown, third light brown, remainder lacking. Front, vertex, genæ and occiput dark brown.

Thorax: Mesothoracic præscutum strongly produced cephalad, entirely covering the pronotum; cervical sclerite elongated, prominent; transverse suture scarcely V-shaped; mesothoracic præscutum, dark brown anteriorly, posteriorly with a pale brown median line, which extends back across the scutum, remainder of thoracic dorsum dark brown. Sterna, episterna and epimera brownish yellow; halteres pale; legs long, dull brown, at the joints somewhat darker; no processes on the fore femora, as described for *M. fragillima* and *M. curtipennis*.

Abdomen uniform brown.

Wings hyaline, costal margin yellow, stigma rather indistinct. Venation (see fig. 3), Sc very long, as in all members of the genus; R long, cross-vein *r* near its tip. R_s gently arcuated, forking far before the tip

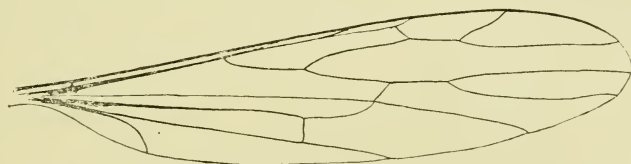


FIG 3.—*Mangonia zambezia*, holotype.

of Sc_1 and in a line with R_{4+5} ; the cross-vein *r* far before the fork of R_{2+3} ; R_2 short, oblique; R_3 long, in a line with R_{2+3} . R_{4+5} fusing with M_{1+2} to form the proximo-anterior border of cell M_2 , thus obliterating the *r-m* cross-vein. M forks at the lower corner of cell M_2 , M_{1+2} departing cephalad, fusing with R_{4+5} for a distance and finally separating, free at the margin; M_3 in a line with M. Cu short, its fork far back, the free position of Cu_1 very long, fusing with M_3 at the fork of M, and continuing to the margin so fused. Cu_2 fuses with 1st A far back from the wing-margin, so that 1st A + Cu_2 is over twice the length of the free portion of Cu_2 alone. 2nd A is very short, suggesting the condition found in *Petaurista*.

Holotype.—♀, Queliniani, Zambesi R., Dec. 20, '08; Mr. C. W. Howard.

The genus *Mongoma*, of which ten species have been described, has a world-wide distribution in the tropics; two species have been described from the West Indies, five species from the East Indies and Australia, and three species from Africa. The genus is distinguished by the excessive length of Sc, the obliteration of the *radio-medial* cross-vein by the long

fusion of R_{4+5} with M_{1+2} , and the decided tendency of Cu_2 to fuse with 1st A.

The West Indian species (*manca* and *pallida* Will., Dipt. St. Vincent, p. 291-293, figs. 6, 7, of *pallida*) and possibly *M. albitarsia* Dol. (E. Ind.), also, which I have not seen, are the most generalized members of the genus, in that Cu_2 and 1st A are distinct to the wing-margin. The intermediate group, containing *trentepohlii* Wièd. (see Wièdemann, Aussereur. Zweifl. Insekt., I, 551; 18, tab. VIb, fig. 12; a better figure in De Meijere, Tijds. voor Ent., 1911, pl. IV, fig. 42), *fragillima* Westw. (see Westwood, Trans. Ent. Soc. Lond., 1881, pl. 17, fig. 1; also Needham, 23rd Rept., N. Y. St. Ent., pl. 21, fig. 6), and *exornata* Berg. (Bergr., Entomol. Tidskrift, 1888, opp. p. 130, fig. 3), has Cu_2 fused with 1st A for a short distance back from the tip ($Cu_2 + 1st A$ less than one-half Cu_2). A third stage in the specialization of this part occurs in *M. pennijes* O. S. (E. Ind). (See De Meijere, l.c., pl. IV, fig. 39.) The maximum of specialization, as far as I know, occurs in the present species, where the fusion of Cu_2 with 1st A is notable, and suggests the condition obtained in the families *Empididae* and *Dolichopodidae*.

Of the three described African species, *M. zambesiæ*, comes closest, apparently, to *exornata*. *M. fragillima* (and probably *M. curtipennis* also, according to Speiser, who compares it with *fragillima*), has vein M_3 separating from Cu_1 , and continuing distinct to the wing-margin; both of these species possess a curious spur-like structure at the base of the fore femora, which does not occur in *M. zambesiæ*.

I have a ♂ of *M. exornata* Bergr., taken at Queliniani, Zambesi R., Dec. 20, '08, in which the fore legs are lacking, and I am unable to state whether or not this structure occurs there. *M. exornata* has been recorded from Delagoa Bay, Portuguese East Africa; Caffraria, E. Cape Colony, and Amani, German E. Africa. It is apparently widely distributed throughout Eastern Africa.

ON THE OCCURRENCE OF A EUROPEAN SPECIES OF MYMARIDÆ IN NORTH AMERICA.

BY A. ARSENE GIRAULT, BRISBANE, AUSTRALIA.

Up to the present I have been successful in finding but a single species of the family Mymaridæ, common to Europe and North America. This species is *Anaphes pratensis* Foerster, which I have captured in Illinois, and of whose characteristics I write of in a paper on Chalcidoidea, to be published soon in Germany; the species is recorded from America

in another paper, to appear in the Journal of the New York Entomological Society. The identification of the species is based on comparison with specimens found in the collections of the United States Museum, labelled as from France, the specific label in the handwriting of Ashmead. The evidence of the establishment of the identification is but presumptive, yet even if wrong, it is still true that we have specimens of a species common to both continents, whatever the name of the species may be. Only the specimens in the National Museum bear witness that it is *pratensis*, and their origin is not known. Nevertheless, Ashmead must have had good reason for so labelling them. For the present, identification must hold.

As I state elsewhere, the species is allied to both *iote* Girault and *nigrellus* Girault; and in this statement the species *hercules* Girault should have been included also; these are all American forms. From both *nigrellus* and *hercules* Foerster's species may be distinguished readily by reason of the fact that the marginal cilia of the fore wing at apex are distinctly longer (by over a third, they are about two-thirds the greatest width of the fore wings). There are a number of minute discal cilia scattered under the venation of the posterior wing, the fore wings are less regularly and uniformly fumated, and the proximal tarsal joints of all legs are longer. Its other characteristics, as compared with those of the American species mentioned above, are given in the papers referred to in this connection. The posterior wing bears two lines of discal cilia along each edge, the inner line of the two out some distance from the edge, toward the mid-longitudinal line of the blade.

In addition to the specimen of *pratensis*, recorded elsewhere, as having been captured in Illinois, I have since seen the following specimens, kindly sent to me by Mr. H. L. Viereck, and belonging to the Connecticut Agricultural College: Two slides bearing respectively a single male and female specimen (one pair in all), and each the label, "New Haven, Ct., 10 May, 1904. H. L. Viereck, *Taraxacum officinale*." In the United States the species occurs in Illinois (Urbana), and Connecticut (New Haven). The Connecticut specimens have been returned to Mr. Viereck.

While on this topic, it is meet to mention the possible identities of several other American forms with those of Europe. A species recently described as *Gonatocerus brunneus* Girault may possibly be *Gonatocerus flavus* Walker (so called), and my (*Stephanodes*) *Polynema psecas* is very similar, and possibly identical with *Polynema enockii* (Girault), a species which Enock described as *Stephanodes elegans* (*Stephanodes* equals *Polynema*; *elegans* preoccupied in *Polynema*). I have considered them distinct, however, as they seem so. Still they must be considered but questionably valid until a better opportunity is afforded for comparing them.

NEW SPECIES AND GENERA OF NORTH AMERICAN
LEPIDOPTERA.

BY WM. BARNES, M.D., AND J. H. MCDUNNOUGH, PH.D., DECATUR, ILL.

(Continued from page 57.)

Amolita delicata, sp. nov.

♂.—Head, thorax and abdomen pale gray; primaries very pale ochreous, suffused in the basal half and along costa with grayish, and finely sprinkled with black scales; faint traces of an oblique ochreous dash from apex to end of cell, caused by a lack of black scaling at this point; two minute black points may or may not be present at end of cell, close together; veins more or less marked with ochreous; fringes concolorous; secondaries slightly smoky, with traces of a dark terminal line and a smoky line cutting the white fringes.

♀.—Very similar to the ♂; the oblique apical dash better defined, due to darker marginal shading on both sides; frequently traces of a dark shade in the cell; veins light ochreous, giving a distinct strigate appearance to outer area of wing; secondaries pure white, with slight sprinkling of dark scales along costa and outer margin; fringes white with dark basal line. Beneath primaries of ♂ smoky, secondaries whitish, sprinkled with smoky especially along costa, and with faint discal dot; in ♀ primaries are much lighter than in ♂ and the discal dot of secondaries is wanting. Expanse, ♂, 25 mm.; ♀, 29 mm.

Habitat: White Mts., Ariz., 9 ♂s, 7 ♀s. Types, collection Barnes.

Vein 8 of secondaries arises from about the middle of the cell and not from the base as in Hampson's definition of the genus *Amolita*. As, however, this is also the case with *roseola* Sm., which is retained in the genus, we place it here rather than in *Doerriesa* Staud., in which it would fall according to Hampson's tables. The ♂ antennæ are laminate. The species varies somewhat as regards the black sprinkling, several specimens being almost uniformly pale ochreous, whilst others are distinctly sprinkled, with the veins showing clearly.

Amolita fratercula, sp. nov.

Primaries: ground colour pale ochreous suffused with gray, and rather evenly shaded with smoky brown; the most prominent feature is an oblique dash of the ground colour which extends from a point on outer margin just below costa inwards to the cell and is shaded superiorly with smoky brown, which shade extends more or less distinctly through the cell to the base of wing, leaving the cubital vein as a fine ochreous line distinct to the discocellular vein. In the ♂ two very faint dark dots are

visible at the end of cell ; fringes concolorous. Secondaries in the ♂ deep smoky with a pale line at the base of the dusky fringes ; in ♀ slightly smoky with pale fringes, cut by a slightly darker line. Beneath primaries smoky, lighter outwardly ; secondaries lighter, sprinkled with smoky brown. Expanse, ♂ 24 mm., ♀ 31 mm.

Habitat : ♂, Palmerlee, Ariz. ; ♀, White Mts., Ariz. ; 1 ♂, 1 ♀. Types, collection Barnes.

The species is closely related to *delicata*, but is in general much darker and lacks the strigate appearance of this species, due to the fact that the veins in the outer area of primaries are not visible ; the dusky secondaries in both sexes first led us to separate it. The apical ochreous dash is also not direct from the apex of the wing but from a point on the outer margin below apex ; the palpi are distinctly longer than in *delicata*.

Redingtonia, gen. nov.—(Type *R. alba*, sp. nov.)

Palpi short, upturned, third joint porrect ; proboscis well developed, front with a pointed corneous prominence, its lower edge produced to a trilobate plate with corneous plate below it ; head and thorax clothed with rough hair, intermingled with scales ; anterior tibia unarmed ; posterior tibiæ clothed with long hair, without spines ; primaries with broad cell, vein Cu_2 from well before lower angle, veins Cu_1 , M_3 and M_2 from around lower angle, M_1 from just below upper angle, areole present, veins R_3 and R_4 stalked, from apex of areole with R_5 , R_2 from areole, R_1 from middle of cell. Secondaries with M_2 obsolescent from below middle of discocellular, R and M_1 from apex of cell, M_3 and Cu_1 from lower angle.

The extraordinary frontal protuberance, which may be compared to that of *Azenia*, with an extra pointed prominence added dorsally, as well as the rough hairy squamation, sufficiently characterize this genus. It falls near *Azenia* Grt., according to Hampson's tables (Lep. Het., Vol. IX).

R. alba, sp. nov.

Front and abdomen pale ochreous. Head, thorax, and wings pure white, immaculate. Beneath primaries rather smoky, secondaries white. Expanse, 29 mm.

Habitat : Redington, Ariz., 2 ♀ s. Type, collection Barnes.

Genus Homolagoa, gen. nov.—(Type *H. grotelliformis*, sp. nov.)

Palpi upturned, 3rd joint long, pointed, smoothly scaled ; antennæ ciliate, ocelli present ; thorax clothed rather roughly with hair and scales ; abdomen of ♀ with a thick tuft of hairs at extremity ; tibiæ unarmed,

front with a prominent wart-like conical tubercle and a slight infra-clypeal plate ; primaries with well rounded outer margin, vein R_1 from middle of cell, R_2 from upper angle of areole, R_3 and R_4 on long stalk, from apex of areole with R_5 , M_1 from below upper angle of cell, M_2 and M_3 close together from above lower angle of cell, Cu_1 from lower angle, Cu_2 from beyond centre of cell. Secondaries with Sc. joined to cell at base, R and M_1 slightly stalked, M_2 curved downwards at base from well above lower angle of cell, M_3 and Cu_1 connate from lower angle, Cu_2 from beyond centre of cell.

The presence of a well developed vein M_2 on secondaries would place the genus in the family *Erastrinae* of Hampson. Apparently its position would be somewhere near *Exyra* Grt. The frontal structure and the abdominal tuft of the ♀, similar to that found in *Lagoa* and certain Liparid species, render the genus easily recognizable.

H. grotelliformis, sp. nov.

Palpi blackish ; head, thorax and primaries white ; abdomen white with the segmental divisions banded with black ; maculation of primaries much as in certain *Grotella* species ; a black dot on costa at base ; a transverse subbasal band of three black dots, one on costa, one on inner margin and the middle one equidistant from both ; a transverse median band of 5 black dots slightly curved inward at costa consisting of a dot on costa, two vertically placed dots at end of cell, a dot below vein 2 and another on inner margin ; fringes white, slightly tipped with black in costal portion ; secondaries smoky, paler basally, with faint trace of a dark antemedial line ; fringes white. Beneath primaries dark smoky brown with white fringes, secondaries white with discal dot and dot about middle of costa. Expanse, 22 mm.

Habitat : Redington, Ariz ; Palmerlee, Ariz., 1 ♂, 2 ♀s. Types, collection Barnes.

Tarache areloides, sp. nov.

Head, front and palpi dark purple-brown, tegulae, thorax and abdomen cream-coloured ; primaries with basal third as far as inner margin of orbicular cream-coloured, remainder of wing deep purple-brown, shaded broadly at anal angle with lighter shades ; basal line geminate, gray-green, extending half across wing ; t. a. line geminate, gray-green, the lines broader at costa, angled inwardly in the cell, incurved on submedian fold ; orbicular and reniform small, oval, outlined with black and filled with blue-black scales, the former usually entirely within the dark area of

wing, occasionally with the inner edge just projecting into the white area ; on the costa just beyond reniform a large white quadrate patch from the base of which the geminate t. p. line arises and bends sharply inward below reniform and orbicular, almost reaching the margin of the dark area of wing ; from a point below the orbicular it turns towards the inner margin, forming two lunulate marks, the upper being the larger ; the space beyond the t. p. line is almost entirely filled with bluish purple ; s. t. line indistinct, marked with creamy at costa and in central area, incurved at vein 2 ; a broken terminal dark purple-brown line ; fringes bluish purple, cut with white opposite cell and between veins 2 and 3. Secondaries whitish with narrow smoky border in ♂, almost entirely smoky in ♀ ; fringes pale. Beneath, primaries smoky with the white patch of upper side marked in ochreous. Secondaries suffused with pale smoky brown, with a discal spot and indistinct postmedian line angled sharply opposite the cell. Expanse, 27 mm.

Habitat : White Mts., Ariz., 3 ♂ s, 5 ♀ s. Types, collection Barnes.

Closely related to *areli* Stkr.; differs in the much larger size of the white patch and the fact that the orbicular is not contained within the light area of wing.

(To be continued.)

THE OLDEST AMERICAN HOMOPTEROUS INSECT.

BY T. D. A. COCKERELL. UNIVERSITY OF COLORADO.

With very few exceptions, the cretaceous strata of North America, so rich in various organic remains, have failed to yield insects. A cockroach from the Judith River Beds in Montana has been described as *Stantonella cretacea* (Handlirsch). A Protoblattoid from the Kootanie of Montana is called *Lygobius knowltoni* Mitchell. Beetle remains named *Archiorhynchus angusticollis* Heer, *Curculiopsis cretacea* (Heer), and *Elytrulum multipunctatum* (Heer), are from the lower cretaceous of Greenland, while one from the Pierre formation of Manitoba is named *Hylobiites cretaceus* Scudder. Egg-masses from the Laramie Beds of Colorado are called *Corydalites fecundus* Scudder. Considering the enormous time represented by the cretaceous, and the richness of the flora, it is certain that there must have existed a succession of insect-faunæ including innumerable types, almost all of which are now unknown to us. This is particularly unfortunate, because during this period the modern families of insects must have been in course of evolution. Tertiary insects we have in abundance, but they are not old enough to

afford much clue to the history of living groups; early mesozoic fossils, so far as found in this country, represent the least specialized of modern orders. In other parts of the world, cretaceous insects are also extremely scarce; of Homoptera, excepting some very dubious gall-like objects on *Eucalyptus* leaves, there is only a single species, the cicadid *Hylaoneura lignei* Lameere and Severian, from Belgium. The first American cretaceous Homopteron has just been found by Mr. Terry Duce in the Pierre formation at Lesser's brickyard, Boulder, Colorado. There is no doubt about the formation, as the specimen is in the same piece of rock as the characteristic mollusc *Scaphites nodosus* Owen. The formation is marine, but it was evidently laid down close to land, and the insect doubtless fell or was washed into the sea.

Petropteron mirandum, n. g., n. sp.

A tegmen or upper wing, the part preserved $7\frac{1}{2}$ mm. long, the actual length probably about $9\frac{1}{2}$; width near the middle about $4\frac{1}{2}$; shape subtriangular, broadly widening apically; veins strong, reddish brown, membrane apparently strong, no markings of any kind; venation as shown in the figure, the interpretation given being scarcely open to doubt, with the possible exception of the first anal, which may be in

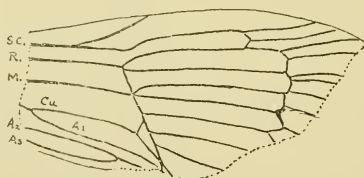


FIG. 4.—*Petropteron mirandum*, n. sp.

reality the inferior branch of the cubitus; there is no sign of a free first anal. There are two series of gradate veins, the inner placed somewhat as in *Dicranotropis*, the outer much as in the eocene genus *Eofulgorella*, and many living forms. The closed anal cell is normal for many Homoptera, and is exactly as in the European cretaceous *Hylaoneura*. The lower branch of the subcosta, although bulging in the direction of the radius near the beginning of the first series of gradate veins, is not connected with it by any cross-vein at this point. The triangular cell in the branches of the cubitus, contiguous with the first gradate series, finds a parallel in Kirkaldy's "restored" figure of *Aneono*. The basal union of cubitus and first anal is as in *Scolypopa*.

I suppose the insect to be a Fulgorid, and this possibility is supported by the occurrence of Fulgoridæ in the older Purbeck Beds of

England. It is quite possible, however, that it belongs to an extinct family.

The name *Petropteron* is in allusion to the Pierre formation.

P. S.—On renewed minute examination, I feel sure I see traces of the end of a free first anal. There seems to be a longitudinal fold or distortion which makes it impossible to follow it any distance toward the base.

BOOK NOTICE.

CONTRIBUTIONS TO THE NATURAL HISTORY OF THE LEPIDOPTERA OF NORTH AMERICA, by Dr. William Barnes and Dr. J. H. McDunnough, Decatur, Ill.

Under the above title have appeared the first two parts of a new and much needed work on the Lepidoptera of North America which will meet with the heartiest commendations from all corners of the continent.

Prior to the publication by Dr. Holland of "The Butterfly Book" and "The Moth Book," there were but few entomologists who could afford to possess, or were fortunate enough to have access to, the rare and expensive separate works and long sets of volumes of periodicals in which to look for figures and descriptions. These two books, and particularly the plates, for the text is of necessity very limited, have proved of the greatest help to beginners and the more advanced as well, and many of us ventured to hope that the time might soon come when a reliable figure of every known North American species would be available. Now after a wait of eight years, our expectations begin to be realized, as the "Contributions" are exactly what we most needed, namely, a series of monographic reviews of families or smaller groups, giving descriptions of all the species, references to the more important literature, placing the generic names on a more stable basis, and last, but not least, photographic figures of each and every species.

Part I deals with "The Cossidæ of North America" and consists of 35 pages of text and seven plates (three of structure and four of imagos) and an index. Part II is entitled "The Lasiocampid Genus *Gloveria* and Its Allies"—17 pages of text, one plate of venation and three plates of imagos and an index, and covers a little wider range of territory, species from Mexico and Central America being included.

The size of page conforms with Dr. Holland's books, the text is well printed on excellent paper and the illustrations are all on plate paper. Much care has evidently been taken to secure accurate reproductions and

in many cases the actual types are shown. We quote the authors' remarks from the introductory chapter of Part I: "Owing to the relative rarity of many of the smaller species from the south and south-west, very few of our North American species have ever been figured. It has therefore seemed advisable to us to illustrate as fully as possible. In many instances we have been enabled to present a figure of the type specimen; in all other cases the specimen used for figuring purposes has been compared with the type either by ourselves or some competent authority." Some of the types referred to are in rather dilapidated condition and it is well that they have been photographed so that their appearance may be retained in a more permanent manner and it is to be hoped that the under surface has also been preserved photographically, although no under sides are shown in any of the figures. Probably this is because, in these groups, the markings of the under side are not of much value in differentiating between species.

While we have nothing but praise for this work, it is our duty to mention the slight and almost inevitable typographical errors, which have caught our eye. In Part I, page 33, lines 12 and 8 from foot of page, the genus *Prionoxystus* is spelled without the second o.; and also on line 12 from foot for *robinae* read *robiniae*.

In Part II, in the explanation of Plates II and IV, the word *forma* is printed in italics, making it appear to be part of the specific names, while the text indicates that they are aberrations.

We hope that these parts will shortly be followed by many others dealing with groups badly in need of elucidation. The price of Part I is \$1.50 and of Part II \$1.00, and they are obtainable from the authors.

Since writing the above, Part III has come to hand, entitled "Revision of the Megathymidæ," 43 pages. Price, \$1.25.

There has been much confusion in identification of the species of these "giant skippers," and also concerning the two sexes of several species, as well as through publication of wrong figures—and the seven half-tone plates of the butterflies, and of their structure, combined with the carefully-prepared text, should enable anyone to correctly identify the specimens they may be fortunate enough to acquire.

Other parts to follow in the near future will deal with "A List of Types in the Barnes' Collection," "Illustrations of Typical and Rare Specimens," and "Fifty New Species, Fully Illustrated."

A. F. WINN.

Mailed March 9th, 1912.



John B. Smith

The Canadian Entomologist.

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No. 4

OBITUARY.

JOHN BERNHARDT SMITH.

It is with profound regret that we have to record the death, from Bright's disease, of Dr. John Bernhardt Smith, Professor of Entomology at Rutgers College, New Brunswick, N.J., Entomologist to the New Jersey Agricultural Experiment Station, and State Entomologist of New Jersey, which occurred at his home during the morning of March 12, 1912.

Dr. Smith was born in New York City on November 21, 1858, so he died at a comparatively early age. It is a coincidence that the late Dr. James Fletcher and the one we now mourn, who were such close friends, should be called away at about the same age. Dr. Smith's early education was received at the Public Schools. He practised law from 1880 to 1884, but his heart was not in such work, and during this latter year he was appointed as a special agent to the United States Department of Agriculture, which position he held until 1886, when he was made Assistant-Curator of Insects in the United States National Museum. Here he remained until 1889, when he was appointed Professor of Entomology at Rutgers College and Entomologist to the New Jersey Agricultural Experiment Station. In 1894, he also received the title of State Entomologist of New Jersey. During the years 1882 to 1890 he was the editor of *Entomologica Americana*. For several years he was also editor of the "Bulletin of the Brooklyn Entomological Society."

Dr. Smith was an extremely busy man, one who in every way served his state and country as few men have. A man of wide experience and deep study he has, in his published works, left behind him a monument of knowledge which will last for all time and which will undoubtedly serve as a guide for many future students of entomology. While in the Museum at Washington, he published some very valuable monographic works, namely, "A Monograph of the Sphingidæ of America, North of Mexico," "A Revision of the Lepidopterous Family Saturniidæ," and "Preliminary Catalogue of the Arctiidæ of Temperate North America." Bulletin No. 44 of the U. S. N. M., pp. 1-424, "A Catalogue, Bibliographical and Synonymical, of the species of moths of the Lepidopterous Superfamily

Noctuidæ, found in Boreal America, with critical notes," was prepared by him and appeared in 1893. This is indispensable to students of these insects, as are also his many "Contributions toward a Monograph of the Noctuidæ of Boreal America." His best scientific work was undoubtedly in this family, of which he was our leading American authority. It is impossible to mention here the many articles which he published, in revising genera, describing new species (of which he created many hundreds), etc. The first paper he published in THE CANADIAN ENTOMOLOGIST appeared in Volume XIV. Since that date he has been one of our most valued contributors. Articles from his pen have been published in 24 different volumes of this journal. A bibliography of his systematic papers would fill many pages; it is to be hoped that such will soon be prepared.

In 1891, Dr. Smith published a "List of the Lepidoptera of Boreal America," which was used generally by lepidopterists. This check list was revised and re-published in 1903. "Explanation of Terms Used in Entomology" was prepared by him and appeared in 1906. His "Catalogue of the Insects of New Jersey," the third edition of which recently appeared, is an extremely useful publication, and the only one of its kind which has been published by any state in the United States.

Other important works, of a popular nature, written by Dr. Smith, are "Economic Entomology," published in 1896, which is a valuable book for students of entomology, farmers, etc., and "Our Insect Friends and Enemies," which appeared in 1909. This latter treats of insects in relation to man, to other animals, to one another, and to plants, and in it there is also a chapter on the war against insects.

As an economic entomologist few men in the world were his equal. His series of annual reports, the first of which was included in the Tenth Annual Report of the New Jersey Agricultural Experiment Station, 1889, and the last, that for 1910, which was published in 1911, together with the many economic bulletins which he prepared, form a valuable source of reference concerning injurious insects, particularly those occurring within the State of New Jersey. The very successful work he did on the control of mosquitoes has been commented upon widely. His special report, published in 1904, 482 pp., upon the mosquitoes occurring within the State of New Jersey, in which is included an account of the different species, their habits, life-history, economic treatment, etc., is an extremely valuable contribution and shows the remarkable capability of the man in dealing with problems of such magnitude. Further accounts of this mosquito work are given at considerable length in his annual reports, since the above dates.

At meetings of farmers, horticulturists, etc., and those of scientific societies, which he was closely identified with, his lectures and helpful talks will be much missed. He received honours from many societies, among which may be mentioned that of Fellow of the American Association for the Advancement of Science, Fellow of the New York Academy of Sciences, Fellow of the Entomological Society of America, Honourary Member of the Entomological Society of Ontario, Honourary Member of the Newark Entomological Society, Corresponding Member of the Entomological Society of Washington, and Corresponding Member of the Ottawa Field-Naturalists' Club. He also had active membership in the Association of Economic Entomologists, Society for the Promotion of Agricultural Science, Brooklyn Entomological Society, Philadelphia Feldman Collecting Social, Brooklyn Institute, Washington Academy, and New Jersey State Microscopical Society.

In 1891, Rutgers College conferred upon him the honourary degree of Doctor of Science.

Like many busy men, he always found time to help others; in his death, we in Canada have lost a true and valued friend. To-day there is a gap in our ranks which it will indeed be difficult to fill.

To Mrs. Smith and the two grown-up children who survive him, we extend our deepest sympathy.

ARTHUR GIBSON.

GEOMETRIDÆ AS YET UNDESCRIBED.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

(Continued from page 31.)

Stamnodes ululata, n. sp.

Expanse, 30 mm. Palpi moderate, extending well beyond the bulging front, pink, rough scaled, the last joint clay-yellow. Front dusky clay. Antennæ clay-yellow, heavily dusted with black scales above. The base of fore legs in front, the collar and bases of patagiæ are deeply roseate. Body clay-yellow, except a white cloud covering the scutellar region and base of abdomen, the latter sparingly sprinkled with roseate scales toward apex. Wings broad and thin in texture, of an even, pale, glistening clay-yellow, a little paler beneath. The primaries along costa, and broadly at apex, are sprinkled with roseate scales. The costa at one-fourth and one-half from the base is crossed by a pale bar, and at three-fourths out, a

April, 1912

semiluculent pale band, after crossing costa, curves outward around cell, and is lost at middle of wing. Secondaries with a faint roseate hue at outer apical margin, without markings of any kind. All wings above and below without discal dots or marginal lines. Fringes rather long, pink, sprinkled towards apices with black scales, which tend to gather at end of veins. Beneath, the primaries, over cell to extradiscal luteous band, outlining this rather sharply, and beyond this band a well-defined apical triangle reaching to centre of outer margin, are heavily dusted with roseate scales, the rest of the surface being entirely clear. Secondaries, without markings of any kind, are evenly and finely dusted with roseate.

Type, one female taken at La Puerta, Calif., Oct. 15th, 1911, is in the author's collection. The immaculate under side of secondaries is quite unusual.

Parexcelsa, nov. gen.

Palpi very small. Tongue obsolete. Front flat, finely shagreened, opaque, margined above between the orbits by a fine polished ridge, the edge apparently of the projecting vertex, which is slightly elevated between the pedicellate bases of the antennæ, these, together with the whole upper surface, being black and highly polished. Antennæ long, bipectinate to apex, where they are shortened so abruptly as to give a blunt appearance. Thorax and abdomen untufted. Legs normal, the hind tibiæ not swollen, without hair-pencil, and having two pairs of spurs. All wings somewhat extended, the outer margins rounded and slightly crenulate, without basal foveæ. Fore wings 12 veins, with 8 and 9 stalked on 7 and with each other, all others free. No accessory cell. Hind wings with costal margin concave, vein 8 parallelling cell for a short distance at or before centre, and showing a vestige of vein 5 toward outer margin; 3 and 4 are widely separate, and 6 and 7 from point.

Type.—*Parexcelsa ultraria* Pears.

This genus, by the faint trace of vein 5, shows a Hydrimenid tendency, but is, in my judgment, best retained among the Ennominae, next to *Hulstina* Dyar.

Parexcelsa ultraria, n. sp.

Expanse, 28–30 mm. Palpi very short, hairy; pale gray. Antennæ stout, the shaft white, with pectinations dark gray. Front covered with a

velvety pile of livid gray. Head, thorax above and primaries above silver-gray, with a mixture of scattered black scales, frosted with white in

part. Abdomen and secondaries a dusky silver-gray. Head and thorax rough scaled; a tuft overhanging front between antennæ. Primaries are marked with jet-black lines, one of which crosses costa at a sharp angle about one-fourth out. Another runs from centre of wing-base along vein beneath cell to its end, and a third from point of cell to apex of wing, broken at its middle by a sharp angle. Below this line to inner margin a series of long sharp points, outlined by a fine black hair line, rest on the veins, their bases joined about centre of wing into an irregular patch. The two lower points are shorter and broader than the rest. Another long

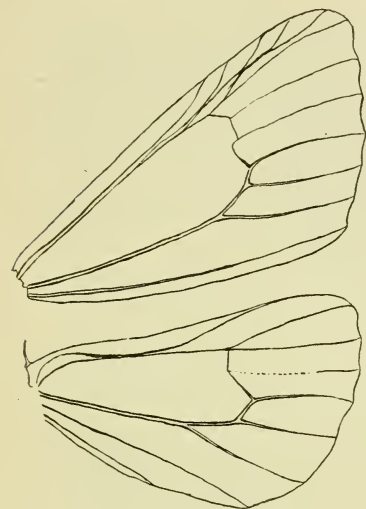


FIG. 5.—*Parexcelsa ultraria*, venation.

point reaches backward through centre of cell nearly to its base, one beneath the black line along its lower margin, and a third, short and broad, between this and inner margin. The included space within these points, and the patch at centre, is a livid gray, almost free from the frosting of white scales, which cover the rest of the surface, forming a snow-white patch above and bordering the black line apex. A short black dash, ending in a cluster of black scales at margin, between the ends of veins. Fringes dusky gray, long and silken. Secondaries without markings. Fringes as on primaries. No discal dots. A fine black marginal line. Beneath ashen, dusky along costa of primaries, and outwardly on all wings, which are bordered with a fine black marginal line. Fringes as above. No discal dots. Body beneath and legs pale ash-gray, sprinkled with black atoms.



FIG. 6.—*P. ultraria*, front view of head.

Type, ♂ from San Diego, Calif., taken Oct. 9, 1910, and thirteen male co-types, Oct. 28, 1911, are in author's collection. The female is unknown to me.

NOTES ON *MELITÆA ALMA* STRECKER.

BY VICTOR L. CLEMENCE, PASADENA, CALIF.

In a recent number of the CANADIAN ENTOMOLOGIST, Karl R. Coolidge published an article entitled "*Melitæa alma* and Its Synonymy." Since the publication of the above article I have added a considerable number of specimens to that group in my collection, with the intention of verifying Coolidge's classification. I have also received specimens of *M. alma*, *M. fulvia* and *M. cyneas* from Dr. Barnes, which have been compared with the types, and which agree with my own series.

I have *M. alma* from Chiricahua Mts., South Arizona; Santa Catalina Mts., Arizona, and Fort Wingate, N. M.

M. fulvia from Fort Wingate, N. M., and Santa Catalina Mts., Ariz.

M. cyneas from Chiricahua Mts. and the Huachuca Mts., Ariz.

All my *fulvia* males are constant, and show very little variation. A few of the females show a tendency to the *alma* form, which is also the case in my *cyneas*. There is no doubt in my mind that typical *alma* is a variety which occurs occasionally in both *fulvia* and *cyneas*, more often in the females. I have taken two female *alma* in the Chiricahua Mts. flying with *cyneas* males. Out of a series of twenty *fulvia* from Fort Wingate three of the females approach the *alma* form. Dr. J. McDunough, with Dr. Barnes, says: "Many of the *fulvia* females show a tendency towards becoming yellow, but most of our males are very constant in this respect." I have not heard of any locality where the *alma* form predominates, but on the other hand there was not one *cyneas* among the *fulvia* from Fort Wingate, and I have never seen a *fulvia* either in the Chiricahua Mts. or Huachuca Mts., where *cyneas* is common.

I believe *fulvia* and *cyneas* bear the same relationship to each other that *leanira* does to *wrighti*, *fulvia* being the more northern form occurring in Colorado, New Mexico and Arizona, while *cyneas* is the more southern form occurring from S. Arizona to S. Mexico. The fact that *alma* occurs in the same localities as both *fulvia* and *cyneas* leads me to think that it was the original form occupying the whole general region, and that owing to geographical surroundings each of the others has become permanent and has gradually taken the place of the parent form, which still is occasionally found among both *fulvia* and *cyneas*, the latter becoming a geographical subspecies. According to priority I should give the following classification:

Melitæa alma Strecker.

Sub.-sp. " *alma fulvia* Edwards.

" " *alma cyneas* Godman and Salvin.

The accompanying plate shows the three typical forms.



MELITAEA ALMA (♀) STRECKER.

M. ALMA CYNEAS (♂, ♀) GOD.-SALV,

M. ALMA FULVIA (♂, ♀) EDWARDS.

THE TRANSMISSION OF TYPHUS FEVER BY LICE.

In a recent paper* some interesting experiments are recorded by Drs. T. Goldberger and T. F. Anderson, which indicate that not only the body louse (*Pediculus vestimenti*) but the head louse (*P. capitis*) also may transmit the virus of typhus fever. These authors had previously shown that Brill's disease, which appears to be endemic in New York City, is identical with the typhus fever of Mexico, which, accordingly, may be identical with the European typhus fever. Evidence of the ability of lice to transmit typhus fever has been previously adduced by several investigators. In 1909, Nicolle, Comte and Conseil demonstrated that body lice (*P. vestimenti*), which had been allowed to feed upon an infected bonnet monkey (*M. sinicus*), were able to transmit typhus fever to two other monkeys, somewhere between the first and seventh day after feeding. In the following year, Ricketts and Wilder, who were working in Mexico, reported the successful transmission of the virus of typhus fever by *P. vestimenti* from man to monkey and from monkey to monkey. They were also able to infect a monkey by intradermal inoculation with the abdominal contents of infected lice, and similar experiments were successfully carried out by Wilder in 1911. Drs. Goldberger and Anderson commenced their work in 1909. They have confirmed the results of previous workers in regard to the body louse (*P. vestimenti*) and have also shown that the head louse (*P. capitis*) is able to transmit Mexican typhus fever from man to monkey by the subcutaneous injection of a saline suspension of crushed and infected head lice and almost certainly by its bite. The typhus virus is able to retain its virulence in the body of the head louse for twenty to twenty-four hours. The authors' conclusions are as follows:

1. The body louse (*P. vestimenti*) may become infected with typhus. The virus is contained in the body of the infected louse and is transmissible by subcutaneous injection of the crushed insect or its bite.

2. The head louse (*P. capitis*) may become infected with virus. The virus is contained in the body of the infected louse and may be transmitted by cutaneous injection of the crushed insect, and, we believe, also by its bite.

These results are of great interest to the entomologist. One by one our most common insects affecting man have been shown to be important factors in the transmission of disease; the house fly carries typhoid and

*"The Transmission of Typhus Fever, with Special Reference to Transmission by the Head Louse (*Pediculus capitis*)."
"Public Health Reports" of the U.S. Public Health and Marine Hospital Service, Washington. W.C. 27, No. 9, 1st March, 1912, pp. 297-307.

certain other infectious diseases ; the flea carries the plague bacillus ; the bed bug has been shown to be transmitting agent of the causative organisms of the serious tropical Black Fever or Kala Azar, and the louse transmits typhus fever. That all the insects directly attendant upon man's person are disease carriers is not a pleasant fact for contemplation !

C. GORDON HEWITT.

TO THE EDITOR OF THE CANADIAN ENTOMOLOGIST :

In your journal of October, 1908, pp. 370-373, I published an account of the attempt made by Hendel to revolutionize the nomenclature of Diptera by introducing generic names from an obscure early paper of Meigen's, which were published without any described species being associated with them—in other words, without types.

Mr. Hendel based his action at the time on his interpretation of the rules of nomenclature of the International Zoological Congress, expressing great regret at the overturning of names, but protesting that the rules compelled it ; later, in *Wiener Entomologische Zeitung*, XXVIII, 33-36, 1909, he took up my argument from the rules themselves, and endeavoured to show that I had not interpreted them correctly. So far, his action was as if forced by these rules. It was interesting, indeed, to find (*W. E. Z.*, XXX, 89-92, 1911), that he has revolted against the rules commission of the I. Z. C., on a minor problem, the mode of designation of types, and refuses to follow them. I cannot help but regret that he did not revolt sooner, so as to spare us the trouble about Meigen's 1800 paper. I think he is perfectly right in his present contention, which relates to point g under Article 30, as amended at the Boston meeting, 1907. But my present purpose is merely to show the embarrassment of a too sweeping acceptance of any rules of nomenclature.

American dipterists have shown a commendable disposition to sit tight during this nomenclatural flurry, and already the worst seems past. On the general question of the validity of a genus without a type, I have noticed two expressions recently that are of interest. One is by S. A. Rohwer, in *Technical Bulletin*, No. 20, Bureau of Entomology, p. 70. He was fixing the types of saw-fly genera, and used the following language : "In this paper a genus is considered to be without standing until it contains a species ; and genera which were founded without species take the first species placed in them as the type, and date from the time when that species was placed in them." If this rule were followed, Meigen's 1800 genera would date from 1908. The other case I found in the *CANADIAN ENTOMOLOGIST* itself, 1912, p. 50, where Mr. Girault is discussing the genus *Trichaporus*, and says : "No species was mentioned as belonging to it ; under the code it is therefore without status."

J. M. ALDRICH, Moscow, Ida.

REMARKS ON *GNYPETA* THOMS. (*STAPHYLINIDÆ* COL.).

BY A. FENYES, PASADENA, CAL.

This rather feebly-characterized Aleocharine genus has the following diagnosis :

Tarsi 4-5-5-jointed ; antennæ 11-jointed ; maxillary palpi 4-jointed ; labial palpi 3-jointed ; ligula bifid ; genæ simple. Hind tarsi with joint 1 not longer than 2 and 3 together. Prosternum membranous under the front coxæ ; mesosternal process obtuse at tip ; middle coxæ separated. The first free ventral segment of the abdomen transversely sulcate at base.

Gnypeta differs from *Atheta* Thoms. by the sulcate ventrites, from *Tachyusa* Er. by the obtuse mesosternal process, and from *Myrmecopora* Saulcy by the comparatively short first joint of the hind tarsi.

In the males the sixth ventrite is produced, and at tip rounded ; in the females less produced than in the males, and at tip sinuate.

The following descriptions of nearctic forms have been published :

1. *nigrella* Lec., n. sp., N. Amer. Col., I, 1863, 29 (*Tachyusa*).
2. *baltifera* Lec., *ibid.*, 29 (*Tachyusa*).
3. *laticollis* Csy., Bull. Cal. Ac. Sc., I, 1885, 287 (*Falagria*).
4. *experta* Csy., *ibid.*, 300 (*Tachyusa*).
5. *linearis* Csy., *ibid.*, 301 (*Tachyusa*).
6. *harfordi* Csy., *ibid.*, 304 (*Tachyusa*).
7. *crebrepunctata* Csy., Bull. Cal. Ac. Sc., II, 1886, 203 (*Tachyusa*).
8. *atrolucens* Csy., Ann. N. Y. Ac. Sc., VII, 1893, 346.
9. *lucens* Brnhr., Deutsch. Ent. Ztschr., 1905, 254.
10. *helenæ* Csy., Tr. Ac. Sc. St. Louis, XVI, 1906, 193.
11. *deserticola* Csy., *ibid.*, 193.
12. *punctulata* Csy., *ibid.*, 194.
13. *ventralis* Csy., *ibid.*, 194.
14. *floridana* Csy., *ibid.*, 195.
15. *bockiana* Csy., *ibid.*, 195.
16. *manitobæ* Csy., *ibid.*, 196.
17. *brevicornis* Csy., *ibid.*, 196.
18. *incrassata* Csy., *ibid.*, 198.
19. *leviventris* Csy., *ibid.*, 198.
20. *oregona* Csy., *ibid.*, 199.
21. *impressiceps* Csy., *ibid.*, 199.
22. *curtipennis* Csy., *ibid.*, 201.
23. *abducens* Csy., *ibid.*, 201.
24. *shastana* Csy., *ibid.*, 202.

25. *majuscula* Csy., *ibid.*, 217 (Euliusa).
26. *sparsella* Csy., *ibid.*, 217 (Euliusa).
27. *elsinorica* Csy., *ibid.*, 218 (Euliusa).
28. *transversa* Csy., *ibid.*, 218 (Euliusa).
29. *mollis* Csy., *ibid.*, 219 (Euliusa).
30. *pimalis* Csy., *ibid.*, 220 (Euliusa).
31. *citrina* Csy., *ibid.*, 220 (Euliusa).
32. *wickhami* Csy., *Mem. Col.*, II, 1911, 166.
33. *brunnescens* Csy., *ibid.*, 167.
34. *boulderensis* Csy., *ibid.*, 167.
35. *oblata* Csy., *ibid.*, 168.
36. *pallidipes* Csy., *ibid.*, 168.
37. *uteana* Csy., *ibid.*, 169.
38. *modica* Csy., *ibid.*, 170.
39. *sensilis* Csy., *ibid.*, 170.
40. *limatula* Csy., *ibid.*, 170 (Euliusa).

REMARKS.

1. *G. nigrella* Lec.—“*Tachyusa nigrella*. Elongate, black, shining, with delicate ashy pubescence, very finely punctulate; thorax obsoletely canaliculate, before the base transversely slightly foveate, a little shorter than broad; abdomen in front slightly narrowed; segments 1-3 transversely deeply impressed; legs blackish-pitchy. Length, .12. Middle and Western States; common.”

There is in the Leconte collection at Cambridge, Mass., a specimen labelled *nigrella*, and there is a pink disk on the pin under the specimen; the pink disk meaning: Middle States (Ohio, Penna., West N. Y.). Below the above specimen, without any name, but probably referred by Leconte to *nigrella*, is another specimen with a pink and yellow disk, the latter disk meaning: Western States (N.-W. Va., Ky., N.-W. Tenn., S. Ill.), and, finally, there is another row with three specimens, all with pink disks.

This species is well characterized amongst the eastern nearctic Gnypetas by the prothorax being simply foveate at base in the female and lacking the geminate punctures; the impression becomes longer in the male, but is not traceable beyond the basal half of the prothorax. It is the most common eastern species in our fauna, not closely related to any other from the northern hemisphere; it is known to me from the following localities: Penna. (Pittsburg); Mass. (Chicopee, Framingham); N. Y. and Md. (Baltimore).

2. *baltifera* Lec.—“*Tachyusa baltifera*. Less elongate, blackish-pitchy, shining, finely punctulate, with delicate pubescence; thorax, elytra

and segments 1-3 of the abdomen piceo-testaceous; thorax canaliculate behind, before the base transversely impressed, a little shorter than broad; abdomen slightly narrowed towards the base; joints 1-3 deeply impressed transversely; antennæ and legs piceo-testaceous. Length, .10. One specimen, Coney Island, near New York. Less elongate than the other species, with fine punctures, especially of the thorax, less dense and more distinct than in the two preceding species." (The two preceding species are *cavicolis* and *nigrella*.)

If my notes are correct, the specimen in the Leconte collection from Coney Island is labelled "*balteata* Lec." This undoubtedly good species is recognizable amongst the eastern forms by the longitudinally, broadly, entirely excavated prothorax of the male; the first joint of the hind tarsi is fully as long as joints 2 and 3 together, the species thus appearing as a connecting link between *Gnypeta* and *Tachyusa*. Not closely related to any other species of the northern hemisphere; known to me from the following localities: Mass. (Tyngsboro, Framingham); Penna. (Jeanette); Ill. (Algonquin); Maine and New York.

3. *laticollis* Csy.—The most common species of *Gnypeta* in California, recognizable at once by the open middle acetabula. It is known to me from Los Gatos, Pacific Grove, Nordhoff, S. Juan Capistrano, Oceanside, Lakeside, Foster, S. Diego, Victorville, S. Bernardino, Elsinore, Riverside, Pomona, Azusa, Pasadena, Sierra Madre, Mt. Wilson, Yuma, all in California. I have also some specimens from El Paso, Texas, which do not appear to be different from the California specimens.

4. *experta* Csy.—Recognized by the male characters. The head in this sex being broadly, almost entirely concave, and the prothorax entirely concave in the middle. The females are somewhat different from the males, especially in habitus, with apparently shorter antennæ and a trifle broader abdomen; they are consequently not easily recognized, unless taken in company of males.

5. *linearis* Csy.—I fail to find any reliable characters which would separate *linearis* from *experta*, and propose to unite these two forms under the latter name.

6. *harfordi* Csy.—In this species the male prothorax is obsoletely depressed in about the basal two-thirds, the depression being shallow and not as sharply limited as in *experta*. I believe I interpret this species correctly. I have seen specimens from Cole, Applegate, Nordhoff, Pasadena, Lakeside and Foster, all in California.

7. *crebrepunctata* Csy.—Apparently a good species, differing from our other western forms chiefly by the much less shining surface and by the

coarse punctuation, also by the shorter and outwardly more incrassate antennæ. I have specimens from California (S. Francisco, S. Barbara, Pacific Grove and Point Reyes); also from Oregon (Newport), the latter being co-types of *G. nigerrima* Brnhr. i. litt. My Pacific Grove specimens were taken near the ocean, on a moist, thickly-incrusted salt flat, under cow manure; and I have no doubt that *crebrepunctata* is exclusively a seashore-inhabiting species.

8. *atrolucens* Csy.—Closely related to (if not identical with), *Gnyptæ cærulea* Shalb. from Northern Europe, differing chiefly from the latter by the more shining integuments. Occurs in the mountainous regions of the Eastern United States (Catskill Mts. in N. Y.; Mt. Washington in N. H.). My 5 specimens from Mt. Washington are, curiously enough, all males, and I have in my collection another male from Vermont. The type of *atrolucens* is said to be a female.

9. *lucens* Brnhr.—A synonym of *laticollis* Csy.

10. *helenæ* Csy.—A good species of the *carbonaria-ripicola* group, with a well-marked, bifoveate antebasal transverse impression on the prothorax. In the male the head impressed, the bottom of the impression impunctate, the prothorax not modified, the 6th ventrite produced and, at the tip, moderately rounded. A species of wide distribution. I have before me specimens from Montana (Kalispell); N. Dakota (Williston); Colorado (Buena Vista); Nevada (Reno); Arizona (Williams), and California (Occidental, Deer Park Springs, Tahoe City and Tallac). My Tahoe City specimens were taken in a swampy place; they appeared to feed on dead tadpoles; other specimens from the same locality were taken during the evening flight.

11. *deserticola* Csy.—Smaller, with paler legs than *helenæ* Csy., but otherwise scarcely different, and probably a synonym of the latter. I have not seen this form.

12. *punctulata* Csy.—Still smaller than *deserticola*, placed at present also as a synonym of *helenæ* Csy. I refer to this form a specimen of the Fall cabinet (from Pomona, Cal.); another specimen from Pasadena, Cal., is more shining, with more sparsely punctate abdomen, but otherwise not different.

13. *ventralis* Csy.—One specimen in my collection from Arizona (Williams), agrees fairly well with the original description, but appears to be quite similar to *majuscula* Csy. also, judging from the description; no opinion can be pronounced about the status of this species until more material is accumulated in our collections.

14. *floridana* Csy.—Can be distinguished by the strongly-dilated abdomen and the very long antennal joint. I have only one male before me, from Enterprise in Florida; it makes the impression of belonging to a good species, possibly from the Central American fauna.

15. *bockiana* Csy.—Can be distinguished from *nigrella* Lec. by the presence of two foveolæ in the transverse basal impression of the prothorax, and by the absence of punctuation in the transverse impressions of the first three tergites. Of this form I have only males before me, one each from Arkansas (Little Rock); Tennessee (Nashville), and Texas (Vaco). Casey does not mention the sex of the type, which is from Missouri (St. Louis).

16. *manitobæ* Csy.—Unknown to me; possibly a more northern form of *bockiana* Csy.

17. *brevicornis*, Csy.—A specimen in my cabinet (collected by Wickham, and labelled "*brevicornis*"), from British Columbia, makes the impression of being a good species; it has the prothorax bifoveolate at base, and can be recognized by the rather short antennæ and the pale colour.

18. *incrassata* Csy.—Five specimens from Montana (Kalispell) in my collection make the impression of a good species, recognizable by the long antennæ and the unusually long third antennal joint.

19. *leviventris* Csy.—Is a close relative of *incrassata*, and may prove to be conspecific with the latter. I have seen nine specimens from the type locality (Ojai Valley in California), they have shorter antennæ than my specimens of *incrassata*, but do not seem to present other characters of specific value.

20. *oregona* Csy.—A synonym of *helenæ* Csy. (vide Casey, Mem. Col., II, 1911, 167).

21. *impressiceps*, Csy.—Unknown to me, possibly a synonym of *laticollis* Csy.

22. *curtipennis* Csy.; 23. *abducens* Csy.; 24. *shastana* Csy.; are, I believe, synonyms of *harfordi* Csy. I have specimens from British Columbia (Duncans), Washington (Baring) and California (Cole) before me, which, after careful study, must be referred to *harfordi* Csy., yet exhibit some slight differences in the general form of the body and in the length of the elytra.

25. *majuscula* Csy.—Unknown to me; perhaps a synonym of *laticollis* Csy.

26. *sparsella* Csy.; 27. *elsinorica* Csy.; 28. *transversa* Csy.; 29. *mollis* Csy.; 30. *pimalis* Csy., and 31. *citrina* Csy., are all synonyms of *laticollis* Csy. My large series of Southern Californian specimens, while showing

variations in size, shape, colour and sculpture, represents undoubtedly one species only, and must be referred to *laticollis* Csy. I have five specimens of *pimalis* Csy. before me (three from the author himself, two from Wickham), none of them specifically different from *laticollis*.

32. *wickhami* Csy.—Possibly a synonym of *helenæ* Csy.

33. *brunnescens* Csy.—Without much doubt identical with *nigrella* Lec. I have two specimens in my collection from New York, which can be referred to *brunnescens*, and which I cannot separate satisfactorily from *nigrella*.

34. *boulderensis* Csy.—Probably a synonym of *helenæ* Csy.

35. *oblata* Csy.—Probably also a synonym of *helenæ* Csy.

36. *pallidipes* Csy.—Possibly a synonym of *harfordi* Csy.

37. *uteana* Csy.—Unknown to me.

38. *modica* Csy.—Probably a synonym of *laticollis* Csy.

39. *sensilis* Csy.—Is *experta* Csy.

40. *limatula* Csy.—Is a synonym of *laticollis* Csy.

The following list of nearctic species (with synonym) is offered tentatively :

- | | |
|---------------------------|-------------------------------|
| 1. <i>nigrella</i> Lec. | 5. <i>harfordi</i> Csy. |
| <i>brunnescens</i> Csy. | <i>curtipennis</i> Csy. |
| | <i>abducens</i> Csy. |
| 2. <i>baltifera</i> Lec. | <i>shastana</i> Csy. |
| | <i>pallidipes</i> Csy. |
| 3. <i>laticollis</i> Csy. | 6. <i>crebrepunctata</i> Csy. |
| <i>lucens</i> Brnhr. | 7. <i>atrolucens</i> Csy. |
| <i>ventralis</i> Csy. | 8. <i>helenæ</i> Csy. |
| <i>impressiceps</i> Csy. | <i>deserticola</i> Csy. |
| <i>majuscula</i> Csy. | <i>punctulata</i> Csy. |
| <i>sparsella</i> Csy. | <i>oregona</i> Csy. |
| <i>elsinorica</i> Csy. | <i>wickhami</i> Csy. |
| <i>transversa</i> Csy. | <i>boulderensis</i> Csy. |
| <i>mollis</i> Csy. | <i>oblata</i> Csy. |
| <i>pimalis</i> Csy. | 9. <i>floridana</i> Csy. |
| <i>citrina</i> Csy. | 10. <i>bockiana</i> Csy. |
| <i>modica</i> Csy. | <i>manitobæ</i> Csy. |
| <i>limatula</i> Csy. | 11. <i>brevicornis</i> Csy. |
| 4. <i>experta</i> Csy. | 12. <i>incrassata</i> Csy. |
| <i>linearis</i> Csy. | <i>leviventris</i> Csy. |
| <i>sensilis</i> Csy. | 13. <i>uteana</i> Csy. |

The accumulation of more material in our collections will probably still reduce the above number of species ; and I venture to express my belief that *bockiana* may prove to be conspecific with *helenæ*, *brevicornis* and *incrassata* with *harfordi*, and *uteana* with *helenæ*. This reduced number of forms can be tabulated roughly as follows :

I.—EASTERN FORMS :

1. Abdomen strongly dilated in the middle.....*floridana* Csy.
Abdomen at most only moderately dilated in the middle.....2.
2. Prothorax broadly excavated in the male.....*baltifera* Lec.
Prothorax not excavated in the male.....3.
3. Colour bluish-black.....*atrolucens* Csy.
Colour black.....4.
4. Prothorax bifoveolate at base.....*bockiana* Csy.
Prothorax not bifoveolate.....*nigrella* Lec.

II.—WESTERN FORMS :

1. Middle acetabula open behind.....*laticollis* Csy.
Middle acetabula entirely closed.....2.
2. Prothorax broadly, entirely concave in the male.....*experta* Csy.
Prothorax never broadly and entirely concave in the male.....3.
3. Prothorax not bifoveolate in the basal impression.....*harfordi* Csy.
Prothorax bifoveolate in the basal impression.....4.
4. More or less shining.....*helenæ* Csy.
Rather opaque.....*crebrepunctata* Csy.

The described Central and South American forms are :

1. *dissimilis* Shp., Biol. Centr. Amer. Col., I, 2, 1883, 173 (Homalota).
2. *nigricans* Shp., *ibid.*, 227.
3. *fragilis* Shp., *ibid.*, 227.
4. *mexicana* Shp., *ibid.*, 228.
5. *boliviana* Brnhr., Bull. Soc. Ent. Ital., LX, 1908, 247.

1. *G. dissimilis* Shp. is tentatively placed here in the genus *Gnypeta* ; it is described from a single specimen.

2. *nigricans* Shp.—In our fauna *bockiana* Csy. seems to be the nearest relative of this form.

3. *fragilis* Shp.—A good species, having no relatives in the nearctic fauna ; recognizable by the pale eleventh antennal joint and the impunctate basal impressions of the first tergites.

4. *mexicana* Shp.—Quite likely identical with *nigricans* Shp.
5. *boliviana* Brnhr.—Apparently without relatives in the nearctic fauna.

There is another species in the neotropical fauna, described by Sharp under the name *Rechota impressa* (Biol. Centr. Amer. Col., I, 2, 1883, 228, 229). *Rechota* cannot be separated from *Gnypeta*, the only distinguishing feature being the truncation of the meso- and metasternal processes; in *impressa* Shp. the middle coxal cavities are open behind, and, in the male, the prothorax is broadly impressed, very much in the same way as in our *baltifera* and *experta*. In our fauna *laticollis* Csy. is somewhat similar in habitus to *impressa*, but lacks the modification of the male prothorax.

The palæarctic fauna contains the following described forms:

1. *carbonaria* Mannh., Prec. Brachel., 1830, 75.
2. *cærulea* Sahlb., Ins. Fenn., I, 1834, 351.
3. *velata* Er., Kaef. Mk. Brdbg., I, 1837, 319.
4. *ripicola* Kiesw., Stett. Ent. Ztg., V, 1844, 317.
5. *canaliculata* J. Sahlb., Sv. Ak. Handl., XVII, 1880, No. 4, 84.
6. *cavicollis* J. Sahlb., *ibid.*, 85.
7. *ænescens* J. Sahlb., *ibid.*, 85.

1. *G. carbonaria* Mannh.—Represented in our fauna apparently by *G. helenæ* Csy.

2. *cærulea* Sahlb.—Our *atrolucens* Csy. may prove to be conspecific with *cærulea*; they are, at any rate, very closely related to each other.

3. *velata* Er.—Without relatives in our country.

4. *ripicola* Kiesw.—Very near to *carbonaria* Mannh.

5. *canaliculata* J. Sahlb., and 6. *cavicollis* J. Sahlb.—Quite likely conspecific; represented in our fauna by the very closely related *G. experta* Csy.

7. *ænescens* J. Sahlb.—Apparently without close relatives in our fauna.

There is one species described from the Indo-Oriental fauna, *elegans* Brnhr., Deutsch. Ent. Ztschr., 1902, 22, from Ceylon; one species from the Australian fauna, *fulgida* Fvl., Ann. Mus. Civ. Genova, XIII, 1878, 583, and two species from the Æthiopian fauna, 1. *angulicollis* Fvl., Rev d'Entom., XXVI, 1907, 58, and 2. *pulchricornis* Fvl., *ibid.*, 58, both from English East Africa.

A NEW TYPE OF CORIXIDÆ (RAMPHOCORIXA BALANODIS,
N. GEN., ET SP.) WITH AN ACCOUNT OF
ITS LIFE HISTORY.¹

BY JAMES FRANCIS ABBOTT, ST. LOUIS, MO.

Our knowledge of the developmental history of the water bugs is very incomplete. In the early days of embryology, *Corixa* was studied by Metschnikoff,² and Brandt,³ and others with especial reference to the germ layers, the revolution of the embryo, etc. Leon Dufour⁴ had previously described the eggs of the two European species, *Arctocoris striata* (L.) and *heiroglyphica* (Duf.).

The only account of the metamorphosis of any member of the group that I have been able to find is that of F. Buchanan White,⁵ who, in addition to describing the egg of *Corixa nigrolineata* (= *Arctocoris fabricii*), also described the first moult, remarking that the tarsus of the third pair of legs is but one-jointed. "At this stage," he says, "they died"—a result which apparently has been obtained by all who have attempted similar observations since. Indeed the rearing of both Notonecta and *Corixa* seems attended with unusual difficulties,⁶ although I believe that by the use of mosquito larvæ for food, success has been attained with the former.

The writer has succeeded in carrying a species of Corixid through the whole series of moults from egg to imago, and since the critical study of the larger groups of Hemiptera is greatly hampered by our ignorance of the developmental stages, it seems worth while to describe the various instars in some detail.

The present species, which appears to be undescribed, has the remarkable habit of attaching its eggs to the carapace of the crayfish, some individuals of which were found almost completely covered by hundreds of tiny eggs. As the writer intends later to discuss this habit in detail, it will be merely alluded to here. The egg-bearing crayfish were captured in a small clear-water pond near Columbia, Mo., the early part of July and were isolated in small aquaria. All the eggs were in the same advanced stage of development, with the red eye spots showing through the shell, and they began to hatch July 8th (1910).

1. From the Zoological Laboratory of Washington University.

2. Zeit. wiss. Zool., XVI, 1866, 422-436, Taf., 26 and 27a.

3. Mem. Acad. Imp. Sci. St. Petersburg., XIII, 1869.

4. Recherches sur les Hémiptères, 1833.

5. "Notes on *Corixa*," Ent. Mon. Mag., X, 1873, 60-63.

6. Cf. Bueno, CAN. ENTOM., XXXVII, 390, 1905.

The mistake was made of attempting to rear the nymphs in small jars. Whether on account of lack of sufficient oxygen or of appropriate food, or too high a temperature or some other unknown cause, the greater number of nymphs perished as soon as hatched.

The remnant were transferred to a large aquarium used for breeding mussels. This was a zinc-lined tank about two feet deep and with a superficial area of thirty or thirty-five square feet, with a layer of soft mud in the bottom and an overflow arrangement by means of which a quiet but constant stream of fresh water was kept circulating through the tank. There were a number of mussels in the mud and several crayfish. A few water weeds supplied shelter for smaller organisms, of which a large Ostracod was the most plentiful. I observed several of the older nymphs feeding on the Ostracods, and it is possible that the absence of some similar food caused the individuals in the separate jars to die.

The newly-hatched nymphs are very active and, as a rule, keep close to the bottom. They are negatively phototropic until the fourth or fifth instar and this condition, which keeps them in the shadows, aided by their great transparency, is doubtless of much value in enabling them to escape their enemies. The bulk of the eggs hatched July 8. The first moult (second instar) occurred about July 16th, the second about July 24th, the third, July 31-Aug. 3, the fourth, August 10th, and the imagos appeared about August 18th. From the third instar on, the mortality was high. In the morning, numbers would be found on the surface of the water near the edge held by a bubble of air, the buoyancy of which they were unable to overcome and, unless assisted, they perished in this way. It seems probable that they are most active at night as they were rarely seen to dart to the surface frequently, except on dull, dark days.

THE EGG.

Length about 9 mm. Breadth about 4 mm. Shape elongate-oval, bilaterally rather than axially symmetrical, i.e., one side nearly straight, the opposite strongly curved. (See Fig. 1.) Colour grayish yellow (later stages only were observed); the surface ornamented with a delicate tracery in the form of interlocking hexagons like a honeycomb or the facets of a compound eye. The egg is fastened in a sort of shallow cup which is of a leathery texture and dark brown in colour. The distal end through which the nymph emerges,

is provided with six to eight short lobes arranged in a circle. The appearance of the whole egg is much like that of a minute *Grantia* sponge.

Dufour described the eggs of *striata* and *hieroglyphica* as acuminate at the free end and placed on a pad. White speaks of the eggs he describes as pyriform and attached at the broader end. He does not mention the pad or cup, nor does Heidemann,⁷ of *Corixa mercenaria*. It would be of interest to discover if there is a difference in this regard between different species of Corixids or whether in some cases the pad or cup has merely escaped observation.

First Instar.

Length about 1.15 mm. Width about .55 mm. General appearance of adult, but wider in proportion to length. (Fig. 2.) Head about three times as wide as long (dorsal aspect); distance from vertex to tip of beak about equal to the width between eyes (ventral aspect). Eyes prominent and conspicuous, deeply pigmented, facets relatively large. The beak is apparently four-jointed, rather broad and conical. The black tips of the mandibles and maxillæ project slightly between the two halves. The former are somewhat shorter than the latter, curved, with minute serrations at the tips, and may be seen to extend into the head apparently up to the level of the eyes.

The antennæ are two-jointed, inserted far down toward the beak, the last joint about $\frac{1}{3}$ the interorbital width in length. Tarsi all one-jointed. Those of first leg when at rest, curved over beak as in imago. First tarsi triangular in section, about $\frac{1}{3}$ as long as those of third leg, $3\frac{1}{2}$ times as long as broad, oblong-triangular, broadly rounded above, the comb of bristles prominent. (Fig. 2a.) Tibia of second leg $\frac{3}{5}$ the length of tarsus and squarish in section with the anterior angles armed each with a row of short bristles. Intermediate tarsus nearly 8 times as long as broad, with a ventral row of long bristles and several rows of much shorter ones; tarsal claws weak, variable in length. Third leg sparsely bristled, tarsal joint slightly longer than the tibia or the femur, which are subequal. Body a little less than twice as long as broad, the posterior angles not so truncate as in later instars, provided and armed each with a half dozen rather long bristles. Lateral margin of body with bristles on posterior half only.

7. Proc. Ent. Soc., Wash., XIII, 1911, p. 140, Pl. XII, fig. 7.

The tracheal system is comparatively simple, consisting of two longitudinal trunks sending off laterals in each abdominal segment and one stout branch to each leg. Anterior branches supply the brain and the eyes.

Second Instar.

A marked increase in size is noticeable, the length being now about 1.9 mm. and the width about .9, roughly one-half as much. Head strongly convex, the frontal margin with a row of rather long bristles, longest in the middle, shorter toward the eyes. Posterior border deeply sinuate or arcuate.

Prothorax about as long as mesothorax, the two together a trifle longer than metathorax; the contour of the two together forming a narrow oval. Posterior margin of metathorax straight, anterior margin concave; its median length about equal to that of head. Abdomen truncate, seven-jointed, last joint about $\frac{1}{2}$ as wide as first joint, terminated by two groups of rather long setæ at the angles.

Tarsi all one-jointed. First tarsus fringed with moderately long setæ, about equal to tibia in length. Second legs; tarsus equal to tibia, both together about as long as femur. Third legs with femora but slightly flattened, tarsus nearly as long as femur and tibia together, clothed with setæ, these longest at the joint, becoming much shorter distally. Colour very transparent. A median grayish line on thorax.

Third Instar. (Fig. 3.)

Length 2 mm. Width 1 mm. Head as before. Eyes a little more than $\frac{1}{5}$ the head-width in width. The wing-pads first appear; about $\frac{3}{5}$ the length of thorax, sparsely hairy. Thorax $\frac{1}{2}$ as long as wide. Abdomen as before, fringed on the sides by rather long setæ, the posterior angles with conspicuous tufts. Ventral surface sparsely pilose.

Tarsi all one-jointed. The whole first leg about equal in length to the femur of second leg. Tarsus about three times as long as broad, terminated by a sharp spine. *Second legs* slender; tarsal claws as long as tarsus, other joints as in third leg, all feebly setose. *Third legs*; tarsus $1\frac{1}{3}$ times the tibia, the latter equal to femur. Tibia and femur together about equal to femur of second leg. Abdomen strongly truncate.

Fourth Instar.

Length 3 mm. Width 1.2 mm. Very much more pigmented and less transparent than previous instars. Posterior margin of

head, posterior angles of eyes, and posterior margin of thorax fuscous. Anterior margin of thorax and inner edge of wing pads with rather dense brownish-black hairs. These together with the pigmented posterior margin of the thorax form a square; a median patch of brown hair joining the band on the anterior margin. General surface of thorax smoky brown with narrow median clear line, and a paler transverse band in the middle. Head pale brown with a darker shading on vertex. Whole dorsal surface of thorax and abdomen sparsely hairy, the abdominal segments faintly indicated by transverse brown stripes. A median longitudinal white stripe $\frac{1}{3}$ the body-width in diameter runs the length of the dorsal surface of the abdomen. Within this is a series of large pale brown blotches, one on each segment, the third and fourth of these with a distinct crescent of chestnut brown,⁸ marginal third of abdomen smoky, fringed with cilia, but these less conspicuous because of the general hairiness of the body. The wing-pads hardly extend beyond the thorax.

Tarsi all one-jointed. *First legs* as before. *Second leg* with femur as long as width of head, equal to tibia and tarsus together. Claws $\frac{1}{5}$ longer than tarsus. *Third leg* with tarsus equal to width of head, feathered with dense hairs. Antennæ $\frac{1}{2}$ the length of tarsus of first leg. Interorbital space $\frac{2}{3}$ the width of head, and equal to $\frac{3}{4}$ the length from vertex to tip of beak.

Fifth Instar. (Fig. 4).

Length 3.8 mm. Width 1.4 mm. Dorsal marking as in previous instar, but more intensified. The two median dark brown marks of third and fourth abdominal terga oblong surrounded by a larger oblong of smoky brown. Hairy covering of wing-pads and thorax conspicuous, the median patch of the anterior border extending more

8. These conspicuous markings are found on the dorsal surface of older nymphs of all species of Corixids that I have examined. I have considered them of glandular nature, and they are so considered by Kunckel d'Herculais (Comptes Rendus, cxx, p. 1,002, 1895), who remarks that the dorsal position of the "scent glands" differentiates the Corixids from Nepa and Notonecta, and put them phylogenetically nearer the Cimicids. J. Gulde, however, in an elaborate monograph published later ("Die Dorsaldrüsen der Larven der Hemiptera Heteroptera" Ber. Senckenb. Ges., 1902, p. 85-136), describes the dorsal glands in all the various families of Rhynchota, including the aquatic families, and denies the presence of such glands in any waterbugs. The Corixids examined were *Corixa geoffroyi* (Leach), *Arctocoris linnei* (Fieb.) and *Cymatia coleoptrata* (L.). He claims that the conspicuous markings are merely the site of the insertion of certain abdominal muscles. It would seem worth while to investigate the matter further.

than $\frac{1}{3}$ the length of thorax down the median axis. Wing-pads extend half way to third abdominal segment. Beak brownish, with short pubescence. Legs pure white, antennæ no larger than before, but fringed with short cilia. Tarsi of first two legs one-jointed; those of third leg two-jointed, otherwise legs as before.

In comparing the various larval stages one is struck by marked increase in the size of the eyes relative to the size of the head as development proceeds. Another point is of great theoretical interest. As is well known, there exists throughout the group an extraordinary sexual dimorphism, such that the uninitiated might be led to class males and females of the same species in different families, so great is the dissimilarity in structure. It is of interest to note that the larval stages up to the last instar, with respect to those structures (palæ, frontal fovea, asymmetry of abdominal segments, etc.), that exhibit this dimorphism, are *entirely of the female type*.⁹ The writer has dissected the much larger *Arctocoris harrisii* Uhl. during the last moults, and has found the same thing to be true. A specimen in the fifth instar just ready to moult may easily be "shelled out" of its cuticle and, if a male, the irregular arrangement of the abdominal segments will be found fully developed, but entirely concealed by the regular and symmetrical arrangement, characteristic of the females and larvæ.

DESCRIPTION OF THE IMAGO.

Ramphocoris balanodis, n. gen. et sp.

Colour.—Head yellowish, tegmina pale silvery grayish, almost iridescent in the female, darker in the male, the characteristic vermiculate or banded markings usual in the group nearly obsolete. Pronotum grayish or smoky brown, suffused with darker in the male. Rostrum pale yellowish. Tergum, legs and whole ventral surface of female pure white. Dorsum of male black, except the lateral margins, which are pale, the ventral surface white, except for two broad almost black oblong bands on either side, each nearly $\frac{1}{3}$ the body-width in width, parallel to but not quite reaching the lateral margin and extending over sternites 3, 4 and 5. Genital segments pale in both sexes. A tiny reddish spot on the outer surface of posterior coxæ, next the distal joint. The hairs of the limbs tinged with yellow. Anterior and posterior margins of pronotum fuscous, the former line sinuate. Surface of pronotum otherwise with three complete pale brown lines, little, if at all, arched, and two shorter ones alternating. Clavus nearly transparent, margined with brown, about one-third

its area adjacent to the scutellum, immaculate. A few complete markings beyond the middle. Corial lines pale smoky or grayish brown, confusedly interrupted or obsolescent, fusing to form three delicate vermiculated longitudinal stripes, these continue upon the membrane. Corium clothed with sparse, fine depressed whitish hairs.

Pronotum and anterior half of clavus rastrate. The tegmina are semi-hyaline, the colour of the dorsum showing through, on account of which the male appears darker than the female. *Pronotum lenticular*, $2\frac{1}{2}$ times as wide as long, its posterior margin evenly rounded and not produced, a small area of scutellum visible between it and the clavus. Head emarginate behind, the lateral angles (with the eyes) acute and slightly produced. Interorbital space about equal to posterior width of eye. Posterior margin of eye touching occipital margin, except for a short distance at the inner angle. Two parallel rows of punctures on either side of the vertex. Intermediate tarsi $\frac{1}{2}$ the length of tibia, the latter $\frac{3}{5}$ the length of femur. Posterior femora and tibia subequal, a little more than $\frac{1}{2}$ the tarsi in length. Metaxyphus small, short, triangular.

Sexual characters.—Male: Head acuminate, strongly carinate, about $\frac{1}{3}$ longer than pronotum. *Fovea acorn-shaped*, broad and deep, occupying the entire space between the eyes and reaching from the labrum to the acute termination of the carina mentioned. Foveal surface clothed with fine depressed whitish hairs. *Pala shiny ivory-white, very irregular in shape. (cf. Fig. 6.) Lower edge entire, slightly concave; upper surface flat, deeply incised about midway the length, so as almost to cut the pala into two joints.* Viewed from the inner surface the outline suggests somewhat the head of a bird of prey. Inner surface with a row of 23 dark brown "pegs"; the first nine following the curve of the upper margin, then the line arching downward to the limit of the cleft. Tip of pala with a single long, serrated spur, a row of short spines along the lower inner edge, a row of longer ones along lower outer edge. The posterior upper margin of the pala projects slightly over the tibia in a flattened spur. Tibia a little less than half the pala in length. Femur with a large stridular area composed of fine spines set in rows. *Asymmetry dextral. Strigil very minute*, .05 mm. long and $\frac{1}{5}$ as wide as long, crescentic in shape, lying in a small membranous projection of the 6th tergite, in the antero-posterior axis, with about 18–20 transverse striæ. Fifth, sixth and seventh tergites divided, fourth deeply cleft.

Female: Venter evenly rounded, front plane with a small circular depressed fovea between the lower inner angles of the eyes. Palæ oblong-cultrate, lower edge straight or slightly incurved, upper edge straight to

the middle, thence truncate to the tip, where there is a short retrorse spine. Tibia same width as palæ and $\frac{1}{2}$ as long.

Length 5 mm.—5½ mm. Boone Co. and St. Louis Co., Mo. July and November.

This species appears to resemble *Corixa* (*Arctocorisa* ?) *acuminata* Uhl., but the structure of the male palæ, which are quite unlike those of any other species in the group, together with the shape of the head in the male, the minute strigil, and the short lenticular pronotum, sharply sets it off from other species. The presence of a frontal fovea in the female is also extraordinary, and together with the points mentioned above seems to warrant separating the species from its congeners in a new genus, for which the name *RAMPHOCORIXA* is proposed, and of which the following may stand as a diagnosis :

RAMPHOCORIXA, n. gen.—Allied to *Arctocorisa* Wallen., from which it differs in the form of the male palæ, strigil and shape of head. Differs from *Glenocorisa* Thoms. in the absence of bristles among the palar pegs. Pronotum lenticular rastrate. Head of male sharply acuminate, with fovea acorn-shaped, ♂ palæ dorsally, deeply cleft, much longer than tibia, terminated by a long serrated spine; femur with a large stridular area of minute spines. Strigil minute. Fifth, sixth and seventh tergites divided in the male. Asymmetry of male dextral. Female palæ cultrate with a short retrorse terminal spine; face of ♀ foveate.

EXPLANATION OF PLATE IV.

Fig. 1.—Egg of *Ramphocorixa balanodis*, × 34. The dorsal cup is affixed to the carapace of the crayfish.

Fig. 2.—First instar, ventral aspect, × 82. A = the pala or first tarsus, × 240.

Fig. 3.—Third instar, dorsal aspect, × 24, showing the beginning of the wing-pads. The setæ of the legs and body are omitted.

Fig. 4.—Fifth instar, dorsal aspect, × 10. The wing-pads have grown beyond the thorax and are covered with downy hair. Cilia of abdomen and legs omitted.

Fig. 5.—Frontal aspect, head of male, × 20.

Fig. 6.—Pala of male, × 51, viewed from inner upper angle. F = femur; T = tibia; P = Pala or tarsus; A = row of pegs; B = stridular area; Q = diagrammatic section of pala marked X.

Fig. 7.—Pala of female, × 68.

Fig. 8.—Antenna × 68.

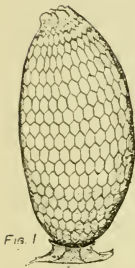


FIG. 1

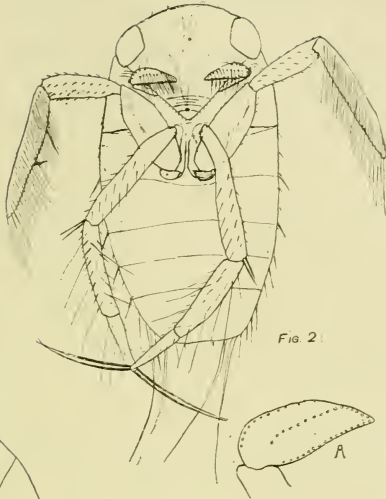


FIG. 2



FIG. 4

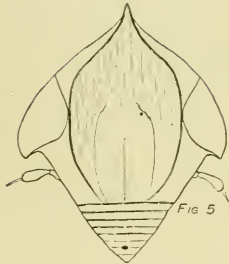


FIG. 5



A

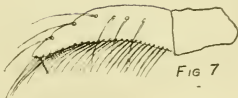


FIG. 7



FIG. 8

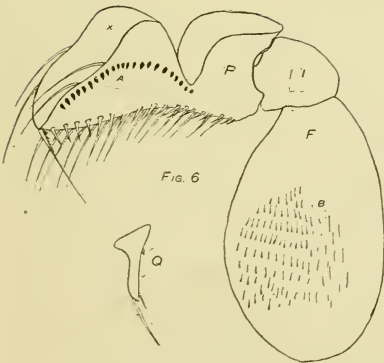


FIG. 9

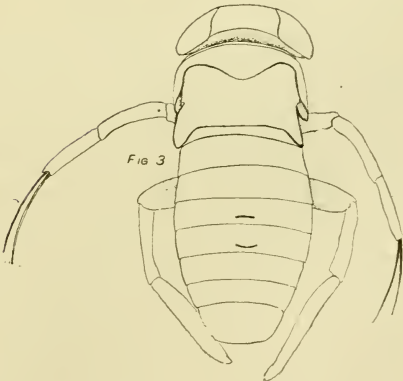


FIG. 10

RAMPHOCORIXA BALANODIS, N. GEN. ET SP.

NEW SPECIES AND GENERA OF NORTH AMERICAN
LEPIDOPTERA.

BY WM. BARNES, M.D., AND J. H. MCDUNNOUGH, PH.D., DECATUR, ILL.

(Continued from page 93.)

Subfamily *Hypheninæ*.*Epizeuxis terrebralis*, sp. nov.

♂.—Antennæ rather lengthily ciliate; palpi upturned, 2nd joint smoothly scaled, attaining to front, 3rd joint long, narrow, pointed; thorax and primaries deep black-brown with indistinct maculation; t. a. line single, wavy, black, inclined slightly outwardly with rather prominent outcurve in submedian fold; reniform an indistinct dark lunular mark, very faintly and only partially outlined in ochreous; from it a faint wavy shade proceeds to inner margin parallel to t. p. line; this latter most distinct of the maculation, slightly outcurved around cell and then parallel to outer margin, slightly wavy with faint inward angle on submedian fold; s. t. line only traceable in costal portion, faint, black; black terminal line and dusky fringes; secondaries dark smoky with broken terminal line. Beneath uniform dark smoky with darker terminal line and small discal spot on secondaries. Expanse, 23 mm.

Habitat: White Mts., Ariz., 1 ♂. Type, collection Barnes.

Smaller and darker than *suffusalis* Sm.; t. p. line less wavy and without the ochreous blotch in reniform.

Bleptina flaviguttalis, sp. nov.

Palpi ochreous; head and thorax pale purplish gray sprinkled with black scales; primaries purple-gray, shaded outwardly with darker and with the remaining area thinly sprinkled with black scales; basal line an indistinct dark upright shade line across the whole area of wing; subbasal area very slightly shaded with ochreous; t. a. line single, black, upright, very slightly bent inwards at costa; orbicular a pale yellow dot, indistinctly outlined with brownish; reniform yellow, triangular, with apex produced towards costa, lower portion containing a black dot; a dark median shade line, indistinct in costal half, wavy below reniform and equidistant from t. a. and t. p. lines; t. p. line black, crenulate, concave below costa, again opposite reniform, outcurved between veins 3-5, incurved between veins 1-3, slight outward angle on vein 1; s. t. line pale yellow, even, outcurved between veins 3-5, otherwise straight, shaded

anteriorly with dark brown ; a terminal row of black dots ; fringes dusky cut by a waved indistinct black line ; secondaries deep smoky with faint pale subterminal line only distinct near anal angle. Beneath pale smoky shading into dark brown outwardly ; a discal dot and faint dark median line on both wings and pale subterminal line, most distinct on secondaries ; fringes dusky. Expanse, 24 mm.

Habitat : Palmerlee, Ariz., 1 ♂. Type, collection Barnes.

A typical *Bleptina*, most closely related to a Texan species which we have identified as *inferior* Grt. In our species the t. a. line is straighter, the lower portion of the reniform larger and the subterminal line of secondaries is distinct at least in the anal half of wing.

Bleptina minimalis, sp. nov.

Palpi recurved, third joint long, very pointed, with slight tuft of scales on posterior side in both sexes ; antennæ finely ciliate ; general colour pale ochreous to dark gray, primaries often considerably shaded with black scales ; maculation varying in distinctness, often almost lacking, in other cases quite distinct ; when present, basal line a slight dark streak very close to base ; t. a. line single, dark, slightly waved, most prominent below orbicular ; this latter spot just beyond t. a. line, longitudinally oval, yellow, small, obscurely outlined in brownish ; reniform yellow, constricted medially, lower portion broader than upper and containing a blackish dot, the whole partially outlined in dusky ; at times the whole reniform is much reduced, becoming a mere yellow streak ; occasionally traces of a faint dusky median shade, usually however lacking ; t. p. line dark, crenulate, shaded outwardly with paler, excurved from just below costa around the reniform, with strong incurve in submedian fold ; s. t. line pale, shaded more or less strongly on both sides with dusky, slightly wavy, excurved in central portion ; a terminal series of dark dots ; secondaries smoky brown, occasionally with traces of a crenulate dark median line and pale subterminal one, mostly however immaculate. Beneath uniform smoky, lighter in basal area of secondaries in the paler forms, which also show traces of the lines of upper side. Expanse, 14 mm.

Habitat : Babaquivera Mts., Ariz.; Redington, Ariz., 2 ♂s, 6 ♀s. Types, collection Barnes.

The small size will readily distinguish this species. In general the ♀s are darker and more obscurely marked than the ♂s. Fresh specimens also appear considerably darker than those that have been in the cabinet some time.

Family *Notodontidæ*.

Hyperæschra stragula, var. *ochreata*, var. nov.

♀.—Primaries pale ochreous brown, maculation as in *stragula*; on costa between basal and t. a. lines a bar of blue-black extending downwards to first brown dash in cell and somewhat sprinkled with whitish; just beyond the discal lunule a large blue-black patch, rather irregularly circular, resting on costa, defined outwardly by the t. p. line, basally by vein 3; this contains two whitish patches, one between veins 4 and 5, the other smaller between veins 6 and 7, and opposite the discal lunule it is indented with white; costal area between it and t. a. line whitish, containing the reddish-ochre discal mark; terminal area blue-black; basal half of inner margin broadly blue-black crossed by the pale curved t. a. line. Secondaries white; fringes shaded with blue-black at inner angle. Expanse, 46 mm.

Habitat: Provo, Ut. (July 21st), 1 ♂. Type, collection Barnes.

The large circular black mark beyond cell is very characteristic, the ground colour is paler than in *stragula* and the s. t. line much less waved. May prove to be a distinct species on receipt of more material.

Family *Thyatiridæ*.

Habrosyne rectangula, var. *arizonensis*, var. nov.

Ground colour of primaries and thorax mouse-gray with none of the brownish shading characteristic of *rectangula*; white dash at base of wing reduced in size; pinkish-white costal and subterminal shading somewhat reduced; secondaries similar to ground-colour of primaries, not brownish as in the type form.

Habitat: White Mts., Ariz., 1 ♂. Type, collection Barnes.

Family *Geometridæ*.

Genus *Grossbeckia*, gen. nov. (type *G. semimaculata*, sp. nov.).

Antennæ of ♂ shortly bipectinate; palpi long, drooping, pointed at extremity, smoothly scaled; fore legs with the femur slightly hollowed out distally to receive the tibia which is $\frac{1}{2}$ the length of the femur and possesses a slight hair pencil beneath, concealing the epiphysis; posterior

tibiæ normal, spurred, outer spur about half as long as the inner; wings long, narrow, primaries with slightly convex costal margin, well rounded apex and rather oblique outer margin; inner margin straight; secondaries slightly crenulate with sharp angle at junction of inner and outer margins; primaries with vein R_1 from about middle of cell; areole long, narrow, exceeding the cell by about half its own length; R_2 , R_3 and R_4 stalked from apex of areole; R_5 from a point with R_2 ; M_1 from lower angle of areole; M_2 from centre of discocellular; M_3 and Cu_1 from lower angle of cell; Cu_2 from near angle; anal vein parallel to inner margin; secondaries with vein M_2 absent, vein S. C. joined to the cell for about $\frac{2}{3}$ of its length; veins R and M_1 stalked; M_3 and Cu_1 connate from lower angle of cell; Cu_2 from near angle; 2nd anal very close to inner margin; frenulum present.

The genus is remarkable in lacking vein M_2 of secondaries and having the subcostal vein distinctly united with the cell, which would place it in the family *Fernaldellinæ* of Hulst. The type species possesses very little resemblance to specimens of the genus *Fernaldella* and is in fact very distinctly *Hydriomenid* in general appearance. We take pleasure in naming the genus after our friend Mr. J. A. Grossbeck.

Grossbeckia semimaculata, sp. nov.

Palpi, thorax and abdomen dark gray, latter pale ochreous beneath; primaries with the costal half of wing alone showing maculation; below cubital vein, with the exception of the inner margin, the whole area is dull gray-brown; costal half of primaries brown, suffused with light and dark gray; a slight black streak at base of wing; from costa near base an obscure dark shade extends obliquely across wing to cubital vein, bordered outwardly slightly with gray; at apex of cell a large white quadrate patch; costal area above this patch largely dark smoky-brown with several pale gray streaks, beyond the patch the brown ground colour forms a small round blotch; from apex of wing inwards nearly to white patch a diffuse gray shade extends, bordered inferiorly by a slightly notched dark line ending in a dark shade, from which two curved dark lines, parallel to outer margin, arise, extending to vein Cu_2 and enclosing a dark gray blotch; terminal area shaded with dark gray; cubital and median veins marked with black; a black shade, broken twice by gray scaling, extends narrowly along the inner margin; secondaries rather pale smoky, fringes

somewhat lighter. Beneath primaries uniform pale glossy brown ; secondaries whitish, shaded with brown along outer margin. Expanse, 31 mm.

Habitat: Palmerlee, Ariz., 1 ♂. Type, collection Barnes.

Bears considerable resemblance to *Cataclothis frondaria* Grt., but the pale immaculate area is much larger and the venation totally different. This pale area is due to the fact that when at rest the wings are so folded that only the costal half of wing is visible, the insect then having much the appearance of a Phycitid.

Diastictis (Cymatophora) pallipennata, sp. nov.

♂.—Palpi, head, thorax, and abdomen white ; ground colour of primaries white, marbled with gray, which shade is predominant beyond the t. p. line ; t. a. line single, rather broad, especially at costa, dark gray, angled outwardly below costa and with slight inward angle on submedian fold ; median space more or less shaded with gray ; a small oval gray mark at end of cell, slightly filled with white ; t. p. line dark gray-brown, curved outward from costa, inward opposite cell and with a rather sharp outward angle in submedian fold, in general parallel to t. a. line ; subterminal and terminal spaces almost entirely olive-gray with the exception of a white costal patch ; through this area a broad white subterminal line runs, rather irregular in course, angled slightly outwardly below apex, the angle preceded by a short dark dash in subterminal space, another slight angle or outcurve between veins 3 and 4, termination at inner angle ; fringes white, checkered with dark gray. Secondaries white, heavily mottled with dark gray, leaving only traces of the ground colour visible ; a faint discal dot and rather heavy dark postmedian line, parallel to outer margin, with slight outcurve before inner margin ; terminal area somewhat darker ; fringes white, faintly checkered with gray. Beneath white, heavily sprinkled with gray ; primaries with discal dot and straight postmedian line ; secondaries with dark postmedian and subterminal lines and discal dot.

Male paler than ♀ ; the subterminal and terminal spaces white with but little dark gray shading ; subterminal line wanting ; from costa near apex a dark dash inward to vein 7, semiparallel to t. p. line. Antennæ bipectinate, posterior tibiae swollen but without hair pencil. Expanse, 19-22 mm.

Habitat: Redington, Ariz., 1 ♂, 4 ♀ s. Types, collection Barnes.

The species has considerable resemblance with *Macaria s-signata* in general type of maculation. The extent of the dark olive-gray shading

is variable, the median area is in some specimens pure white, in others quite smoky ; the discal mark may be present or absent.

Phycitiinæ.

Euzophera strigalis, sp. nov.

Palpi upturned, 3rd joint moderate, pointed, smoothly scaled with whitish ; pectus and legs pale gray ; antennæ of ♂ lamellate and ciliate ; front gray ; thorax and primaries dark gray, sprinkled with lighter ; primaries with the basal area and central area at end of cell slightly less sprinkled than remainder of wing ; all maculation wanting, except that the veins are prominently outlined in black, giving a strigate appearance to the wing. Secondaries, hyaline, with white fringes, slightly smoky at apex of wing. Beneath primaries smoky ; secondaries as above, costal margin sprinkled with dark scales. Expanse, 42 mm.

Habitat : Eureka, Ut., 1 ♂. Type, collection Barnes.

Related to *E. gigantella* Rag., but lacks all traces of the transverse lines.

BOOK NOTICE.

INSECTS OF FARM, GARDEN AND ORCHARD.

"INSECT PESTS OF FARM, GARDEN AND ORCHARD," by E. Dwight Sanderson. Publ. John Wiley & Sons, 43 East 19th Street, New York ; also The Renouf Publishing Company, 25 McGill College Ave., Montreal. XII, 684 pp., 513 figs. \$3.00.

The increasing number of workers in economic entomology and the consequent enormous output of literature embodying the results of their, or other people's, investigations is rendering it gradually more difficult for the student, farmer or fruit-grower to gain a knowledge of the life-histories of and means of controlling the insects with which they have to deal. Any means whereby this difficulty can be lessened is an addition to the insect-fighting organization as a whole, and its welcome is proportionate to its efficiency. We give a whole-hearted welcome to this last addition to our economic literature, and are glad that the author found the necessary leisure time to develop and complete a work which he is eminently fitted to carry out.

It is impossible in a review of this nature to give more than a superficial idea of the contents. In the author's words, it has been his effort "to

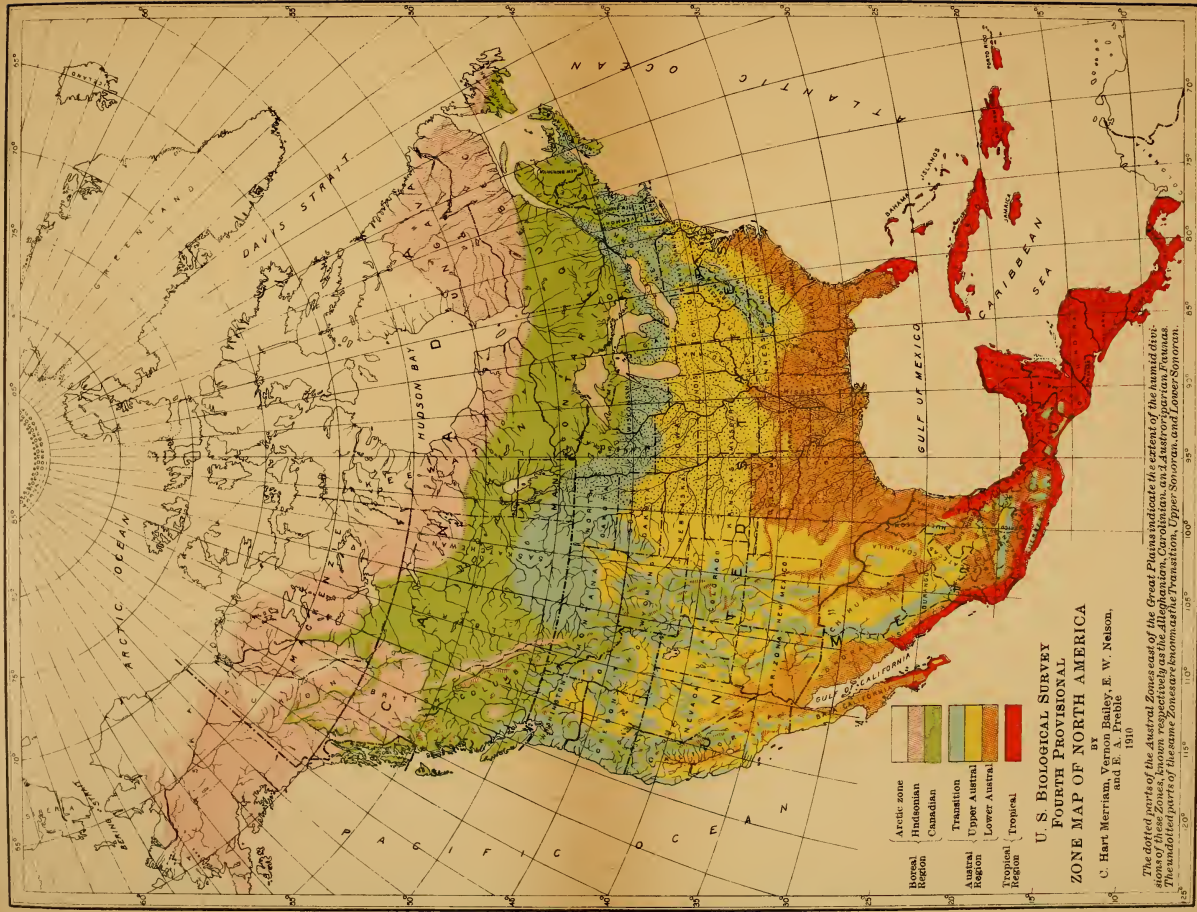
discuss all of the important insects of farm, garden and orchard at sufficient length to give a clear idea of their life-histories and habits, and also the best means of control, so that the book may be used as a reference work both by the student of economic entomology and by the practical farmer, gardener or fruit-grower." His effort has certainly been successful, with the result that in addition to a well-balanced treatment of the insects affecting staple crops, such as his previous work, now out of print, gave, he has included insects affecting small bush and orchard fruits. The well-selected references which are given under each insect to the more important bulletins on that insect and its control, will prove of great value to the student or to the agriculturist with a thirst for more knowledge, and there are many such.

Like our injurious insects, the author recognizes no international boundary, in fact, his free annexation of our provinces is almost startling at times; Nova Scotia, however, is not "Southern Canada" (p. 619), but eastern.

While the author has succeeded to a remarkable degree in his use and choice of popular names, there are one or two instances where we believe that the name is too long to be suitable for popular use; nevertheless, we fully realize the difficulty of choosing a short name, which is at the same time distinctive. The author calls *Cephus pygmaeus* Linn. the Wheat Saw-fly Borer; this name might not be recognized by persons accustomed to call the species the Wheat-stem Saw-fly or the Wheat-stem Borer. Such instances serve to indicate that we are still a long way from the solution of the question of popular nomenclature, and that there is much careful work yet to be done by not only our own Committee on Nomenclature, but by an International Committee.

The book is illustrated by over 500 figures, which, with a few exceptions, are excellent, and their clear reproduction is due to the fine quality of the paper used. With the exception of a certain number of typographical errors and one or two inverted figures, which are troubles from which all authors are compelled to suffer at the hands of their printers, there is no fault to find with the printer's share of the work. Its reasonable price should make it one of the chief books of reference, especially for those for whom the book is written, and we hope that the second edition will soon make its appearance.

C. GORDON HEWITT.



The dotted parts of the Austral Zones east of the Great Plains indicate the extent of the humid division in the Appalachian, Carolinian, and Australian portions of the zone. The unshaded parts of the same Zones are designated as the arid, semi-arid, and Lower Sonoran.

The Canadian Entomologist.

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LONDON, MAY, 1912.

No. 5

MAP ILLUSTRATING FAUNAL ZONES OF NORTH AMERICA.

Through the courtesy of Dr. H. W. Henshaw, Chief of the Biological Survey of the United States Department of Agriculture, we are enabled to publish the Fourth Provisional Zone Map of North America. This map has not yet been published by the Biological Survey, by whom it was prepared, to accompany a revised edition of their Bulletin No. 10, now in course of preparation, but has appeared in the American Ornithologists' Check List.

Our object in publishing this map is primarily to assist those engaged in the preparation of the Catalogue of the Insects of Canada and Newfoundland. (See pp. 273-275 of Vol. XLIII of this journal.) On page 274 it was stated that the geographical distribution of each species within Canada and Newfoundland will be given. "This will be indicated as a rule by Provinces, in order from east to west, e.g., N. S., Ont., B. C., etc. The characteristic faunal zones inhabited by the species will be indicated so far as it may be possible by abbreviations, thus: Ar.—Arctic, H.—Hudsonian, C.—Canadian, T.—Transitional" With the addition of Upper Austral, to be indicated by "U. A.", these are all the zones which are represented in Canada and Newfoundland, so far as we know at present. The entire map of North America has been published, as it is impossible to consider or discuss the faunal zones of Canada apart from those of the United States.

In stating the distribution of provinces, the recent extensions made to the boundaries of the Provinces of Manitoba, Ontario and Quebec should be noted. The northern boundary of Manitoba is marked by the 60th parallel, and the new north-eastern boundary is a line drawn from the north-eastern corner of the original boundaries to the shore of the Hudson Bay, where the latter is intersected by the 89th meridian. The Province of Ontario extends northward to the Hudson Bay, east of the eastern boundary of Manitoba. The Province of Quebec extends northwards, and includes the region of Ungava.

Mr. Edwin C. Van Dyke, of San Francisco, Cal., who has made a careful study of faunas of western North America, in a recent letter to me,

proposes that the following should be included in a zone to be named *Vancouverian*: That portion on the southern side of the inner Aleutian Islands, South-eastern Alaska and the Islands of the Coast, Western British Columbia, including the islands, Western Washington, the western portion of Northern Oregon, and a strip along the coast of California, to a little south of San Francisco Bay. That this zone has not been included in our scheme is not evidence of its non-acceptance, for we believe that Mr. Van Dyke's proposal is supported by a number of facts. Pending further investigation, however, we have deemed it advisable to restrict ourselves to the zones already indicated.—[C. GORDON HEWITT.

REPORT ON THE CELEBRATION OF THE CENTENNARY OF THE FOUNDATION OF THE ACADEMY OF NA- TURAL SCIENCES OF PHILADELPHIA.

BY F. M. WEBSTER,

Delegate from the Entomological Society of Ontario.

This noted gathering was, thanks to the united efforts of the members, an entire success. The entire world of letters, personified by a company of more than one hundred distinguished men and women, representing the institutions of learnings and scientific societies of this country and Europe, participated in the ceremonies. The fine new lecture hall of the academy was given over to the carrying out of the set programme, made up of papers on purely scientific subjects, prepared and read by the distinguished delegates at the meeting.

On the platform were seated Mayor Blackenburg; Dr. Samuel G. Dixon, president of the academy; Sir James Grant, of the Royal Society of Canada; Dr. Edward J. Nolan and Dr. J. Percy Moore, the secretaries.

Among the smaller social events in connection with the centennial celebration was a dinner given by Dr. Henry Skinner, of the academy, at his home in Glenn road, Ardmore. There were present the following delegates, representing the entomologists, in which particular branch of natural science Dr. Skinner is especially interested: Dr. W. J. Holland, of the Carnegie Museum, Pittsburgh; Professor J. H. Comstock, of Cornell University; Professor C. W. Johnson, of Boston, representing the Boston Society of Natural History; E. T. Cresson, of Philadelphia, representing the American Entomological Society, of which he was founder; Dr. Philip P. Calvert, of the University of Pennsylvania, representing the Sociedad Aragonesa de Ciencias Naturales, and Professor F. M. Webster, Washington, D.C., representing the Entomological Society of Ontario.

The address of the president, Dr. Dixon, was exceedingly gratifying to entomologists, by reason of his laying some stress on the fact that among the original founders of the academy was Thomas Say, the father of American entomology. In his mention of the services many of the former members of the academy had made to science, he again spoke of Thomas Say, who went out with the Long Expedition to the Rocky Mountains, in 1819. This was followed by expressions of appreciation of the later works of Le Conte, Horn, Cresson and others. He told of the size and importance of some of the special collections, mentioning among others the collection of insects which now numbers 1,000,000 specimens and has world-wide renown.

Doctor Dixon showed the practical use of the work of the academy, and the real value to people and Government in the study of insect life; the now known cause of many preventable diseases, among them yellow fever, an outbreak of which was promptly suppressed in New Orleans, La., and malaria, which have been banished from Cuba and the Panama Canal section. He gave some figures showing the immense damage done to crops by insect life, and showed the money loss in this field, which economic entomology is trying to correct, to be more than \$1,000,000,000 a year.

There were but two papers presented relating exclusively to insects. The first by Henry Skinner, M.D., D.Sc., on "Mimicry in Butterflies."

Dr. Skinner's long familiarity with these insects rendered his paper of unusual interest and value. First calling attention to the many cases of deceptive resemblance among butterflies, and the very much that had been written on protective mimicry, both in this and other countries. he called attention to the fact that actual observations on the feeding of birds on butterflies were almost entirely lacking here in America, so much so that at the present time protective mimicry among butterflies must be admitted to be far more fancied than real, and, that the proof justly demanded by science was here conspicuously lacking. The doctor rested his case on the scientific as well as legal objection of "not proven." The second paper, by Mr. Jas. A. G. Rehn, dealt with "The Orthopterological Inhabitants of the Sonoran Creosote Bush" throughout the country along the Mexican border so rich in new and unique species of insects. It was of much interest not only relative to Orthoptera but also from a faunal point of view.

PROF. WEBSTER'S ADDRESS.

Members of the Academy of Natural Sciences of Philadelphia :

A very pleasing duty has devolved upon me as an honorary member of the Entomological Society of Ontario, in having been delegated to

represent that body, at this your 100th anniversary, and to convey, for the Society, its hearty congratulations and good wishes for your continued prosperity and success.

It will perhaps not be out of place for me to call attention at this time to the fact that this sister society, but four years the junior of the Entomological Society of Philadelphia, afterwards the American Entomological Society, expects, next year, to celebrate its 50th anniversary.

We, who have had the good fortune to attend the meetings of this Society across the border, cannot easily forget the cordial greeting and warm comradeship we have always enjoyed, and we all the more appreciate the hearty God-speed which I am expected to convey to you. Not only have our colleagues done a grand work in Canada, but the pages of the CANADIAN ENTOMOLOGIST have been as freely open to us as to their own numbers.

Insects know no national boundaries, therefore those who study them must be equally cosmopolitan in their investigations. So, also, science knows no race, nationality or creed, because it deals with the universal, and in recognition of this, my message becomes all the more appropriate.

F. M. WEBSTER.

ON THE LARVAL STAGES OF CERTAIN ARCTIAN SPECIES.

BY WM. BARNES, M.D., AND J. MCDUNNOUGH, PH D., DECATUR, ILL.

A. phyllira Drury.

In a previous article (CAN. ENT., XLIII, 257), we described the final larval stage of this species. Since then we have been successful in breeding from the egg, and append our notes on the various stages. Packard has already described the larval history (Jour. N. Y. Ent. Soc., III, 178), but rather briefly, so that we feel justified in publishing our own account as a verification and amplification of Packard's. It has been suggested that *phyllira* is but a variety of *rectilinea* or vice versa. We would call attention to the fact that in *phyllira* larvæ the spiracles are orange, whilst in *rectilinea*, according to Gibson (CAN. ENT., XXXV, 117), they appear to be black; this would seem to suggest that we are dealing with distinct species. All our bred specimens showed (apart from slight increase or decrease in the heaviness of the white markings), very little tendency to variation, and in no case could we detect a specimen with traces of white markings on the veins in the outer portion of the wing; *phyllira* normally possesses a slight white dash on the subcostal vein and occasionally one on the cubitus near base of wing, as figured by Drury, but beyond this the veins are not outlined with white. The white markings on the veins

of *rectilinea* on the other hand show apparently a marked tendency to obsolescence, and we possess several Illinois specimens in which we can detect but the merest trace of white on the veins; in fact, were it not for locality, they might easily be mistaken for *phyllira*. Continued breeding will be necessary to decide the question as to whether the above mentioned larval distinction holds good.

In the accompanying sketch we give a diagram of the position of the primary tubercles in the first stage of *phyllira*; this is apparently typical

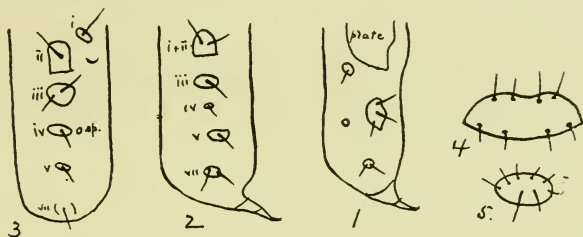


FIG. 7.

- | | |
|--------------------------|-----------------------|
| 1. Prothoracic segment. | 4. Prothoracic plate. |
| 2. Mesothoracic segment. | 5. Small plate. |
| 3. Abdominal segment. | |

for the genus *Apantesis*, at least it holds good for all the species that are discussed in this present paper. On the meso- and metathoracic segments tubercles I and II coalesce forming a single wart with two setæ; on the abdominal segments, I and II are separate, the former being minute; III contains two setæ, a typical Arctian feature; IV is immediately behind the spiracle, V directly below IV, each one with seta; VI is absent and VII is represented only on those abdominal segments which bear no prolegs as a minute seta; on the thoracic segments VII is a more prominent wart with two setæ. On the prothorax and 9th and 10th abdominal segments considerable reduction of the tubercles takes place. In the following descriptions if no reference to the position of the tubercles is made, it may be taken for granted that they correspond with the above diagram.

Ovum.—Conical from a flat base; very slightly sculptured; pale yellow, shiny, with no colour change until just previous to emergence when it becomes blackish; deposited promiscuously on the ground.

Stage I.—Head black with sparse setæ; body pale greenish brown with blackish tubercles and large black thoracic plate, this latter containing 8 black setæ arranged in an anterior and posterior row of four. On the thoracic segments the setæ of tubercles I, II and III are black, the others being white; on the abdominal segments I–IX tubercle II contains a

black seta and the dorso-anterior one of III is also black ; the remainder are white. On the 9th abdominal segment the whole dorsal portion to each side of the central line is occupied by a large tubercular patch containing three black and one white setæ, the latter situated on the lower posterior portion ; below this large patch is a small tubercle with a single white seta. The anal plate is small, oval, and dark in colour, containing two central setæ and a marginal row of six minute white ones on posterior side. Legs blackish ; prolegs similar in colour to body. Length, 3 mm.

Stage II.—Head black with numerous short setæ; body greenish, strongly marbled with red-brown, the marbling so arranged as to leave a stripe of the ground colour extending along the body below tubercle II, giving the appearance of a subdorsal line. A series of white patches, more or less evident dorsally, situated between tubercles II. Thoracic plate tends to break up into two anterior mounds and a single transverse posterior one, the former each containing about 7 black setæ, inclined forward over the head, the latter with 4 long straight black setæ and two white ones, arranged three on each side of the central dorsal line. On the prothorax the small tubercle behind the plate contains two white setæ; the large tubercle anterior to the spiracle 6 black setæ and 1 white one, situated anteriorly; the lateral tubercle bears 3 white setæ. On the meso- and metathorax tubercle I and II contains 8-9 black setæ and 1 small anterior white seta inclined forward; tubercle III bears two long black setæ, a small white one on the anterior margin and a similar one on the posterior portion; tubercle IV is small with two white setæ; tubercle V bears 7 setæ, of which on the mesothorax 3 are black and 4 white, on the metathorax 2 black and 5 white, the posterior black one having changed colour; tubercle VII bears 6 white hairs. On the abdominal segments tubercle I is minute, bearing a short white seta, II has a small white seta on anterior margin inclined forward and a long central black seta surrounded by a ring of 5 others; there are usually 2 small white setæ on anterior margin of III and one on posterior portion, and further 5 long black setæ arising out of the central area; tubercles IV and V contain each 4-5 fine white setæ; tubercle VII is small, on leg-bearing segments with three small white hairs, on others with but one or two setæ, absent on 9th abdominal; the large tubercle of this segment bears about 12 black setæ, of which the central one is longest and points backward; further there are about 5 small white hairs around outer margin. The anal plate is small, heart-shaped with about 12 minute hairs, both black and white, situated mostly towards the posterior margin. All black setæ are strongly barbed. Legs black. Length, 6 mm.

Stage III.—Head black with short setæ as in previous stage ; body red-brown with a pale yellow dorsal stripe ; the mounds of the prothoracic plate are more distinctly separate than in previous stage, the anterior ones being kidney-shaped, each bearing 8-10 setæ, the posterior one narrowly oval with about 8 upright barbed bristles ; almost all these setæ are black, an occasional short white one being intermingled. Tubercles shiny, black, prominently conical, tubercle I minute ; tubercle II largest with about 12-15 spiculated black spines, those of the rear segment being longest and inclined backward ; tubercle III with black setæ ; tubercle IV with two central black and about 8 white setæ ; other lateral tubercles entirely with white setæ. Legs black ; prolegs colour of body.

In late stages the body colour appears greenish marbled strongly with red-brown and with central lateral portions of abdominal segments showing traces of orange. Length, 9 mm.

Stage IV.—Head as before ; body dark gray ; marbled with black, and with a pale creamy, usually continuous, dorsal stripe. All tubercles black, shiny, II very large ; lateral tubercles, especially V and VII, shaded prominently around the base with orange. There is considerable increase in the number of setæ, which are mostly prominently barbed. Legs black ; prolegs orange. Length, 12 mm.

Stage V.—Much as in previous stage. Pale yellow dorsal stripe shows a tendency to narrow or disappear intersegmentally ; traces of a broken yellow subdorsal line, composed chiefly of a strip of colour between tubercles II and III. Tubercles I and II black, others either tipped with orange-brown or entirely suffused with this colour. Spiracle orange, prolegs pale reddish. Length, 23 mm.

Stage VI.—Similar to preceding. In freshly moulted specimens all lateral tubercles show very strongly orange, becoming however later more tinged with black ; dorsal stripe prominent ; subdorsal line almost obsolete. Length, 29 mm.

Stage VII.—We would refer to our previous article (CAN. ENT., XLIII, 259) for the description of this, the final stage. All larvæ examined agreed excellently with the description drawn up from the spring brood.

Apantesis placencia A. & S.

Ovum.—Practically identical with that of *A. phyllira*, deposited promiscuously.

Stage I.—When first emerged pale yellow with black head, turning later dirty brown. Tubercles large, blackish, with long setæ, arranged as in *phyllira* ; setæ of I-III black, of lateral setæ white ; prothoracic plate dark, large, with apparently 6 black setæ. Length, 3 mm.

Stage II.—Head black. Body red-brown with greenish intersegmental tinge; no trace of markings. Tubercles black, I minute with single white seta, II large, with about 5 black setæ, those of the posterior segments being longest and inclined backward, III with 3 or 4 black setæ, IV and V each with 3 small white outwardly inclined setæ. Thoracic plate semilunate, black, with a double row of four setæ. Length, 6 mm.

Stage III.—Head black. Ground colour greenish gray heavily mottled with dark brown and with lateral central portions of segments broadly reddish orange, giving the general appearance of a reddish-orange ground colour, the true ground colour being only apparent intersegmentally and dorsally. A dorsal series of orange diamond-shaped patches, more or less concealed by a thin line of the same colour. These patches are not prominent, being similar in colour to the lateral orange shading; they are most recognizable immediately following the moult, when the lateral colour is not so developed. Tubercles black with considerable increase in the number of setæ. Length, 9 mm.

Stage IV.—Head black. General appearance much darker than in preceding stage. Body gray-green with dark brown marbling; dorsal deep-orange stripe more prominent; lateral orange shading considerably reduced, being confined mostly to the base of the tubercles; these latter shiny black with numerous black setæ, except V and VII which still bear white ones. Spiracle black, prolegs reddish. In late stages the colour becomes paler and the lateral orange markings are again plain. Length, 12.5 mm.

Stage V.—Head and body jet black with large shiny black tubercles which show a great increase in setæ; these are barbed, but not nearly so prominently so as in *phyllira*. A broken dorsal reddish stripe is present. Prolegs reddish; stigma black. Length, 22 mm.

Stage VI.—Scarcely any change from previous stage; rather blacker, dorsal stripe often lacking, when present much broken into spots of reddish orange; tubercles very shiny and large. Length, 30 mm.

Stage VII.—This final stage has already been described by us. (Vide CAN. ENT., XLIII, 259.)

The resultant imagines showed but little variation; in one ♀ there was a slight indication of the W mark due to a few light dots in the subterminal area; in most specimens, however, the tendency was to a reduction rather than an increase of the light markings of primaries. The ♀s agreed well with the figure published with the above mentioned article.

(To be continued.)

ON NORTH AMERICAN PHLÆOTHRIPIDÆ (THYSANOPTERA), WITH DESCRIPTIONS OF TWO NEW SPECIES.

BY J. DOUGLAS HOOD, U. S. BIOLOGICAL SURVEY.

Trichothrips anomocerus, sp. nov.—(Plate VI, figs. 1-4)

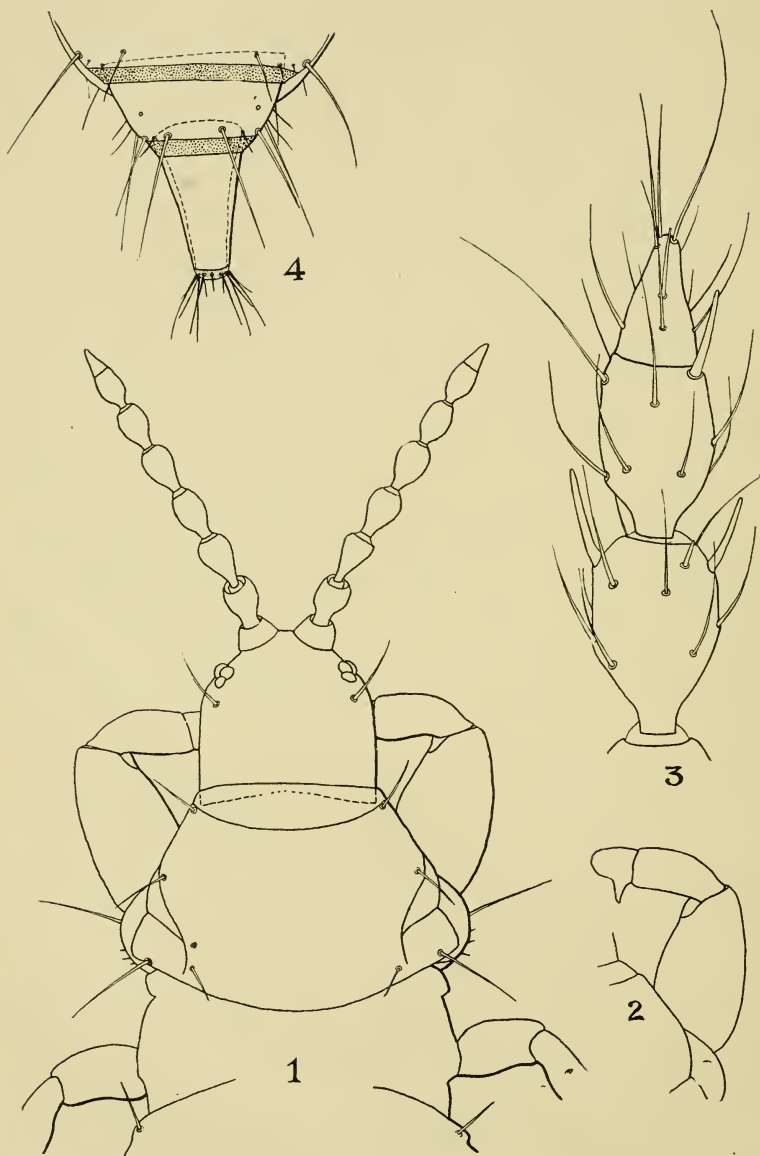
Female.—Forma brachyptera. Length about 1.5 mm. Colour clear brownish yellow, with conspicuous hypodermal pigmentation in head, thorax and abdomen, which is orange by reflected light and maroon-brown by transmitted light; tube heavily chitinated and darker at middle; segments 7 and 8 of antennæ blackish brown.

Head distinctly wider than long, blunt anteriorly, frons not at all produced between antennæ, dorsal and lateral surfaces with very minute spines; vertex flat, evenly declivous; genæ subparallel, rounded; postocular bristles pointed, moderately long. Eyes greatly reduced, only one facet visible on lateral profile. Ocelli wanting. Antennæ slightly more than twice as long as head, the last two segments compactly united, the separating suture scarcely visible; segment 3 subconical; 4-6 oval, pedicellate; 7+8 lanceolate, pedicellate; segments 1 and 2 exactly concolorous with body; 3-6 successively very slightly darker; 7+8 rather abruptly dark blackish brown; sense cones moderate in length, slender; formula: 3, 1-1; 4, 1-2; 5, 1-1⁺¹; 6, 1-1⁺¹; 7, 0-1; 8 with one at middle of dorsum. Mouth-cone not quite attaining base of prosternum; labium broadly rounded; labrum pointed, scarcely surpassing labium.

Prothorax large, massive, notum weakly chitinated; it is distinctly longer than head (about equal in length to width of head), and across the coxæ is just twice as wide as long; bristles long, pointed; anterior marginals wanting. Pterothorax greatly reduced, narrower and shorter than prothorax. Legs stout, concolorous with body; fore femora short, thick; fore tarsus armed with a strong, acute tooth.

Abdomen large, heavy, about one and one-fourth times as wide as pterothorax; all bristles pointed. Tube thickly chitinated, slightly shorter than head, about two and one-half times as wide at base as at apex; terminal bristles short, about half as long as tube.

Measurements: Length, 1.53 mm.; head, length .18 mm., width .20 mm.; prothorax, length .205 mm., width (inclusive of coxæ) .40 mm.; pterothorax, width .37 mm.; abdomen, width .47 mm.; tube, length .17 mm., width at base .101 mm., at apex .041 mm. Antennæ: Segment



TRICHOTHRIPS ANOMOCERUS, SP. NOV.

1, 45μ ; 2, 56μ ; 3, 62μ ; 4, 56μ ; 5, 59μ ; 6, 51μ ; 7, 45μ ; 8, 33μ ; total, .41 mm.; width at segment 4, .039 mm.

Male.—Forma brachyptera. Slightly smaller than female. Length about 1.1 mm. Prothorax very slightly, if any, heavier than in female. Fore femora slightly more swollen; tarsal tooth a little stouter. Abdomen slender, tapering from near the base.

Measurements: Length, 1.09 mm.; head, length .17 mm., width .19 mm.; prothorax, length .192 mm., width (inclusive of coxæ) .37 mm.; pterothorax, width .32 mm.; abdomen, width .38 mm.; tube, length .13 mm., width at base .083 mm., at apex .036 mm. Antennæ: Segment 1, 45μ ; 2, 50μ ; 3, 56μ ; 4, 49μ ; 5, 53μ ; 6, 47μ ; 7, 43μ ; 8, 29μ ; total, .37 mm.; width at segment 4, .034 mm.

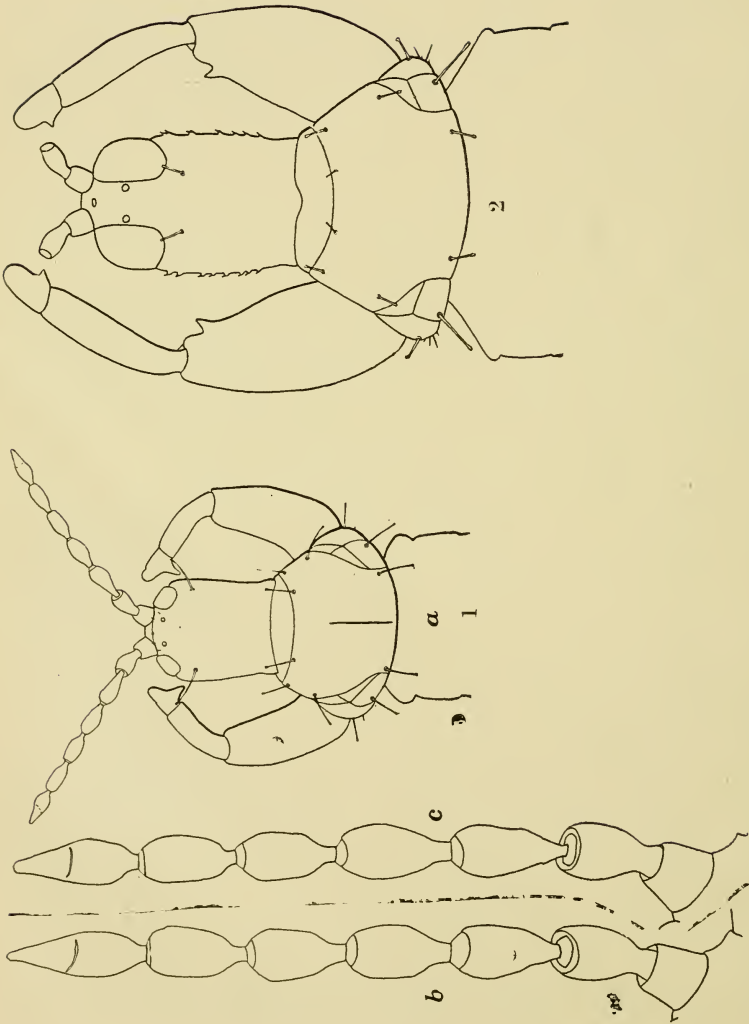
Described from fifteen females and seven males, taken in February under sycamore bark at Plummers Island, Maryland (in the Potomac near Washington, D. C.), by Mr. W. L. McAtee.

The form of the apical antennal segments seems to ally this species quite closely to *T. ambitus* Hinds, from which, however, it is abundantly distinguished by the shorter tube, shorter and broader head, and the much heavier prothorax. The general facies of the species is thus that of *T. pedicularius* Haliday and *T. americanus* Hood.

Cryptothrips junctus, sp. nov.—(Pl. VII, fig. 1, *a*, *b*, *c*.)

Female.—Forma brachyptera. Length about 1.7 mm. Surface smooth, shining, anastomosing lines scarcely evident. Colour by reflected light bright crimson red; head and prothorax darkened with blackish brown; tube, legs and antennæ nearly black. Colour by transmitted light blackish brown; the head, prothorax and abdomen with a nearly continuous layer of bright crimson hypodermal pigment; antennæ dark blackish brown, segments 1 and 2 and pedicel of 3 slightly paler; legs slightly paler than antennæ, non-pigmented, tarsi pale yellow.

Head rectangular, about one and one-fifth times as wide as long; cheeks parallel, rounded very abruptly to eyes and slightly flaring at base; vertex rounded, slightly produced; postocular bristles long, explanate and divided at tip. Eyes small, flattened, protruding, anterior in position and directed forward. Ocelli small, subapproximate, anterior, the posterior far removed from the eyes. Antennæ seven-segmented, with an oblique suture at middle of ventral surface; spines and sense-cones long, slender; formula: 3, 1-2; 4, 2-2; 5, 1-1⁺; 6, 1-1⁺; 7, 0-1. Mouth-cone large, heavy, blunt; maxillary palpi more than half the length of pronotum.



CRYPTOTHRIPS JUNCTUS, SP. N., AND ACANTHOTHRIPS NODICORNIS REUT.

Prothorax three-fourths as long as width of head and (inclusive of coxæ) slightly more than twice as wide as long; usual bristles all present, long, dilated and divided at tip. Pterothorax much broader than long, sides subparallel. Legs short, rather slender; fore tarsi armed with a rather long, acute tooth.

Abdomen stout, about one and one-half times as broad as pterothorax; sides subparallel at base, converging roundly from segment 6 to tube. Tube about .6 as long as head, distinctly more than twice as wide at base as at apex, tapering evenly.

Measurements: Length, 1.75 mm.; head, length .30 mm., width .25 mm.; prothorax, length .18 mm., width (inclusive of coxæ) .40 mm.; pterothorax, width .39 mm.; abdomen, width .57 mm.; tube, length .17 mm., width at base .092 mm., at apex .039 mm. Antennal segments: 1, 48μ ; 2, 66μ ; 3, 66μ ; 4, 68μ ; 5, 64μ ; 6, 64μ ; 7, 90μ ; total length of antenna, .47 mm.; width at segment 4, .037 mm.

Female.—Forma macroptera. Differs from the brachypterous form only in the presence of wings and the consequent increased development of the pterothorax.

Fore wings much broader than hind pair, sparsely fringed, and of equal width throughout; subapical fringe double for five or six hairs; the three subbasal spines knobbed; wings of both pairs uniformly brown in colour.

Male.—Forma brachyptera. Differs from the brachypterous female in the somewhat slenderer head with subconcave cheeks, as seen from above, larger prothorax with a thickened median line becoming obsolete before apex and base, stouter and slightly arcuate fore femora, longer and stouter tarsal tooth, and the slenderer abdomen.

Described from twenty females (two of which are macropterous) and eleven males from Baldwin, Michigan, and Mahomet and Murphysboro, Illinois. Specimens were taken April 17, August 16, September 4 and November 7, under bark on white oak, soft maple and sycamore, by Dr. H. E. Ewing, L. M. Smith and the writer.

Type locality: Baldwin, Michigan.

The seven-segmented antennæ, elongate maxillary palpi and the armed tarsus of the female distinguish this species at once from *C. rectangularis* Hood and *C. carbonarius* Hood, the only North American species properly referable to *Cryptothrips*.

During the latter part of August, 1908, I found pupæ of this species in abundance at Baldwin, Michigan, under the loose scales of the bark of

some white oak trees (*Quercus alba*) which stood in a lowland sandy area between two small lakes ; and with them was occasionally seen a wingless male or, more rarely, a wingless female. By August 31 adults were plentiful, always wingless, and the males greatly outnumbered the females. September 2 females were abundant, and one of those taken was macropterous. September 4 two males and a second winged female were found to have matured in a vial which contained pupæ taken September 2.

Acanthothrips nodicornis Reuter.—(Pl. VII, fig. 2.)

This species has long been known as *Acanthothrips nodicornis*, but Amyot and Serville's *Hoplothrips corticis*, dating from 1843, is probably identical with it. The only North American record of the species is that by Franklin (*Psyche*, Vol. X, p. 222, 1903), who found a single female under loose bark on a sycamore tree at Amherst, Massachusetts. My specimens, four females and six males, were taken in an open sandy forest about twelve miles from Baldwin, Michigan. One hot summer's day in August many were seen in copulation on the stump of a young poplar, which two weeks before had been cut for tent stakes ; but when approached they scampered hastily away or dropped at once to the ground and secreted themselves among the fallen leaves. The few taken are all somewhat larger than European examples, averaging nearly one millimeter longer than several specimens (presumably cotypes) received from Prof. Reuter. The drawing and the following description, based on North American examples, may be of use to students of the group.

Female.—Length about 3 mm. Dorsal surface closely subreticulate ; ventral surface smooth. Colour by reflected light nearly black ; abdominal segments 3–8 marked at base with a pair of latero-dorsal white blotches, about equal in size to the second antennal segment. By transmitted light the colour is dark blackish brown with maroon pigmentation ; antennal segments 1 and 2 concolorous with the body, 2 paler at apex ; segments 3–5 with base and apex yellow, intermediate portion blackish brown ; segments 6–8 slightly lighter than body, the base of segment 6 yellowish ; legs concolorous with body, excepting tarsi and extremities of tibiae, which are yellowish brown.

Head one and one-half times as long as wide ; sides subparallel, converging slightly to eyes and to base, forming a slight neck-like constriction ; dorsal and lateral surfaces sparsely spinose, the lateral spines arising from anterior surface of prominent tubercles, of which about eight are visible on each cheek ; postocular bristles short, blunt, inconspicuous, one-third

as long as eyes.* Eyes large, very finely faceted, one-third as long as head and about as wide as their interval. Ocelli moderate in size; anterior ocellus slightly overhanging the abruptly declivous vertex. Antennæ slender, about one and three-fourth times as long as head; segments 3-6 urn-shaped; 7 and 8 closely united, the latter conical; sense-cones long and slender, scarcely distinguishable from the antennal bristles; formula: 3, 1-2; 4, 1-2⁺; 5, 1-1⁺; 6, 1-1⁺; 7 with one on dorsum near apex.† Mouth-cone pointed, attaining the mesosternum.

Prothorax about .6 as long as head and, inclusive of coxæ, about twice as wide as long; usual spines all present, expanded distally. Pterothorax slightly wider than prothorax; sides nearly straight, slightly converging posteriorly. Wings large, powerful, arcuate, of nearly equal width throughout; fore wings faintly washed at base with brown, and with the three subbasal spines nearly equal in length and blunt; apical fringe double for about thirty hairs; hind wings with a faint vein at costal third reaching about to middle. Fore femora large; subapical tooth acute and directed slightly anteriorly; fore tarsi armed with a broad acute tooth, the anterior margin of which is at right angles to the tarsus.

Abdomen large, broadly rounded at apex; marginal bristles dilated at tip. Tube about .8 as long as head, tapering evenly from base to apex; terminal bristles about as long as tube.

Measurements: Length, 3.2 mm.; head, length .43 mm., width .29 mm.; prothorax, length .27 mm., width (inclusive of coxæ) .56 mm.; pterothorax, width .65 mm.; abdomen, width .69 mm.; tube, length .34 mm., width at base .104 mm., at apex .052 mm. Antennal segments: 1, 48 μ ; 2, 73 μ ; 3, 148 μ ; 4, 129 μ ; 5, 120 μ ; 6, 87 μ ; 7, 75 μ ; 8, 44 μ ; total, .73 mm.; width, .042.

Male.—Shorter and slenderer than female. Length about 2.6 mm. Fore femora larger, stouter, nearly as wide as head; tarsal tooth larger, slightly curved. Abdomen tapering evenly from about segment 6 to base of tube.

*Moulton, in his Synopsis, Catalogue and Bibliography of North American Thysanoptera, Tech. Ser., 21, Bur. Ent., U. S. Dept. Agr., states in his key on page 19 that *H. magnafemoralis*, *nodicornis* and *doanei* have no postocular spines. This is incorrect as regards the first two species, at least.

†The formula for the antennal sense-cones is the same as this in both *H. magnafemoralis* Hinds and *H. albivittatus* Hood. In the original description of the latter species, however, their positions are not so described, the three rudimentary cones and the full-developed one on the outer surface of the third segment having been overlooked in the nearly opaque and otherwise unsatisfactory type specimen.

EXPLANATION OF PLATES VI AND VII.

Plate VI.

Fig. 1. *Trichothrips anomocerus*, sp. nov.—Female, $\times 117$.

Fig. 2. *Trichothrips anomocerus*.—Apex of right antenna of female, $\times 514$.

Fig. 3. *Trichothrips anomocerus*.—Tip of abdomen of female; membranous portions stippled; $\times 117$.

Fig. 4. *Trichothrips anomocerus*.—Right fore leg of female, $\times 117$.

Plate VII.

Fig. 1. *Cryptothrips junctus*, sp. nov.—a, head and prothorax of σ , $\times 67$; b, left antenna of φ from Michigan, $\times 199$; c, left antenna of φ from Illinois, $\times 199$.

Fig. 2. *Hoplothrips nodicornis*, Reuter; φ , head and pronotum; $\times 67$.

LASIOPTERYX MANIHOT, N. SP. (DIPTERA).

BY E. P. FELT, ALBANY, N. Y.

The small, yellowish midges were reared from *Cassava* (*Manihot utilissima*), July 15, 1911, by Mr. W. H. Patterson, of the Agricultural School, St. Vincent, W.I. This species appears to be allied to *L. carpinii* Felt, from which it is easily distinguished by the narrow wings. The longer, stouter antennæ in both sexes serves to separate it from a more closely allied undescribed form.

Male.—Length, 1 mm. Antennæ nearly as long as the body, thickly haired, fuscous; 13 segments, the fifth with a stem about $\frac{1}{2}$ the length of the basal enlargement, which latter has a length $\frac{1}{2}$ greater than its diameter and bears a thick whorl of long, stout setæ; terminal segment produced, with a length thrice its diameter and tapering to a narrowly rounded apex. Palpi yellowish. Mesonotum fuscous yellowish. Scutellum, postscutellum and abdomen yellowish, the latter sparsely haired. Wings subhyaline, broad, costa dark brown, the membrane rather thickly clothed with linear scales. Halteres yellowish. Coxæ and femora mostly yellowish, the tibiæ slightly darker, the tarsi fuscous yellowish; claws very long, slender, unidentate, the pulvilli rudimentary. Genitalia; basal clasp segment moderately stout; terminal clasp segment long, stout. Other organs indistinct.

Female.—Length, 1 mm. Antennæ extending to the base of the abdomen, rather thickly haired, fuscous yellowish; 13 subsessile segments, the fifth with a length about $\frac{1}{2}$ greater than its diameter and with a thick whorl of long, stout setæ; terminal segment reduced, narrowly rounded apically. Palpi yellowish, the first segment subquadrate, the second narrowly oval, the third as long as the second, the fourth $\frac{1}{2}$ longer than the third, somewhat dilated. Abdomen apparently lighter than in the male; ovipositor short, terminal lobes narrowly oval and sparsely setose. Other characters nearly as in the male.

NOTES ON CUBAN WHITE-FLIES WITH DESCRIPTION OF TWO NEW SPECIES.

BY E. A. BACK, VIRGINIA AGRICULTURAL EXPERIMENT STATION.

From an economic standpoint, there are probably no insects in Florida so detrimental to interests of citrus growers as the citrus white fly (*Aleyrodes citri* Riley and Howard), and the cloudy-winged white-fly (*Aleyrodes nubifera* Berger), which cause an annual estimated loss to the citrus industry of that state of over \$1,125,000.*

For several years, the writer, with others, was engaged in an investigation of these insects and during that time many reports of white-fly infestations of *Citrus* in Cuba were brought to our attention. Considering the wide spread distribution of the citrus and cloudy-winged white-flies in Florida and the large amount of citrus nursery stock that had been shipped into Cuba from Florida nurseries, it was to be expected that these two species must necessarily have been introduced long ago. As a result of the demand by Florida citrus growers for an examination into the white-fly situation in foreign countries in hopes of discovering a parasite or other enemy that would be of assistance in controlling white-fly pests in Florida, the writer, while still in the employ of the Bureau of Entomology, U. S. Dept. Agric., made an investigation during October and November of 1910 in Cuba and Mexico.

During this search several species of white-flies were collected in Cuba. Heretofore only *Aleyrodes howardi* and *nubifera* have been correctly recorded from Cuba. A more extended collection will, beyond doubt, bring to light many species not listed here, but already recorded from other islands of the West Indies.

It is very generally believed throughout Cuba and Florida that the two great white-fly pests of Florida are present in abundance in Cuba. This is largely due to the fact that all aleyrodids whenever seen, no matter whether on guava or other vegetation, are thought to be the citrus white-fly. As a matter of fact, the citrus white-fly which causes the greatest loss of all white-flies now known has never been found in Cuba, and the cloudy-winged white-fly, next in injuriousness, only in slight numbers. While nine species are here recorded from Cuba, none are at present serious pests because of the work of parasites and fungus diseases. The Citrus White-fly, *Aleyrodes citri* Riley and Howard.

There is no authentic record of this havoc-working species in Cuba.

*White-flies Affecting Citrus in Florida, Morrill & Back, Bulletin 92, B. E., U. S. Dept. Agric.

May, 1912

Cook and Horne* refer to this species as being introduced into Cuba at Santiago de las Vegas on Florida nursery stock.

An examination of material in the Bureau of Entomology, Washington, by Prof. Quaintance, and of material collected by Cook and Horne at the Cuban Experiment Station by the writer, leaves no doubt that *A. nubifera* is the species regarding which they wrote. Frequent reports both in Florida and Cuba of injury caused by this insect to Cuban citrus groves are entirely groundless. In no citrus grove visited from Havana west beyond Bahia Honda, for over 100 miles east of Havana, or in the Isle of Pines in the general vicinity of Santa Fe, was any trace of this pest found. Over three thousand acres of citrus were examined. Mr. W. H. Hoard, of Victoria de las Tunis, who has been thoroughly familiar with this insect in Florida for many years, states that it does not occur, to his knowledge, in Central and Eastern Cuba. Cuban growers of citrus may well feel thankful that this pest has not yet secured a foothold on their island. As this species feeds on coffee almost as greedily as on *Citrus*, as evidenced by examinations made by Dr. E. W. Berger in Florida and by the writer in the Audubon Park greenhouses in New Orleans, the coffee industry of the island would be affected should this pest become abundant. Coffee plants examined by the writer at Seiba Mocha were free from white-fly.

The Cloudy-winged White-fly, *Aleyrodes nubifera* Berger.

This is the species referred to by Cook and Horne (l. c.) erroneously as *citri*. They stated in 1908 that since first seen this species had been decreasing so that at that time it was very difficult to find more than a few healthy specimens in one place. In their opinion the red fungus (*Aschersonia aleyrodidis*) was responsible for this gradual decrease. While the writer examined many orange and grape-fruit trees of all ages in Cuba, even trees in the grove in which it was present in 1908, he was unable to find specimens, but Prof. P. Cardin found orange trees in the Vedado district of Havana badly infested during June, 1911, and sent specimens to the writer. As the red fungus is known in Florida to attack only sparingly this aleyrodid, it is more than probable that other causes have brought about this condition of scarcity, especially the wholesale mortality due to overcrowding as a result of the peculiar habit of the adults of this species to crowd small areas of the tenderest growth with eggs far beyond its capacity to furnish room for the development of the larvæ subsequently

* Bulletin 9, Estacion Central Agronomica de Cuba, 1908, page 30.

hatching therefrom and the deaths due to what is believed at present, in Florida, to be bacterial in origin.¹

While the citrus white-fly feeds on a number of plants and trees, the cloudy-winged has been found only on citrus and the rubber tree, *Ficus nitida*. Its discovery on the latter food plant in New Orleans by the writer November, 1910, was such as to indicate its probable origin in India or China. While this species is doubtless still present in Cuba, it cannot be said to be of economic importance at this writing.

The Woolly White-fly, *Aleyrodes howardi* Quaintance.

This species was found quite generally distributed on orange trees wherever these grow in Cuba and Isle of Pines. It is this species which causes the blackening of foliage to which reference is frequently made. It is, however, not a serious pest and cannot be classed in destructiveness with *citri* and *nubifera*. Its spread is most rapid among old orange trees and during the drier seasons. Being a species possessing a thick pupa it is heavily parasitized. It is not only parasitized by the red fungus *Aschersonia aleyrodinis*, as noted by Cook and Horne (l. c.) and by the writer at Seiba Mocha, Guinis, Santiago de las Vegas, and on the Isle of Pines, but is preyed upon by the larvæ of a Tortricid moth. Frequently colonies were found, each pupa of which showed the emergence hole of a hymenopterous parasite or devoured by Tortricid larvæ. The life history of the species and its occurrence in Florida has been treated by the writer.²

Besides occurring in Cuba and Isle of Pines, it has been found at Tampa, Ft. Myers and Miama, Florida. It occurs quite generally in the West Indies.

The Paw-paw White-fly, *Aleyrodes variabilis* Quaintance.

This white-fly has previously been reported only from Florida by Quaintance³ and Back⁴ and from Barbadoes by Gowdy.⁵ Recently it has been found in abundance at Santiago de las Vegas on paw-paw (*Carica papaya*) by Prof. P. Cardin. It causes a severe blackening of the foliage at times.

1. Natural Control of White-flies Affecting Citrus in Florida, Morrill & Back, Bulletin 102, B. E., U. S. Dept. Agric.

2. The Woolly White fly: a New Enemy of the Florida Orange, Back, Bulletin 64, pt. 8, B. E., U. S. Dept. Agric.

3. Tech. Bull. No. 8, Div. Ent., U. S. Dept. Agric.

4. Florida Fruit & Produce News, 1910.

5. West Indian Bulletin, Vol. IX, No. 4.

Aleyrodes floridensis Quaintance.

This white-fly has been reported by Quaintance (l. c.) from Florida on guava (*Psidium*) and alligator pear (*Persea perseæ*), and in Barbadoes on both these and smilax (*Theabroma cacao*) by Gowdy (l. c.) It was found by the writer in Cuba only on guava in the Botanical Gardens at Havana. While generally present in Florida wherever the alligator pear is grown, no evidence of injury has ever been known to follow even the heaviest infestations, and it will probably never be a pest in Cuba.

Aleyrodes mori Quaintance.

This aleyrodid with a black pupa case and white wax marginal fringe has been reported only from Florida, where it infests several plants, more especially the mulberry (*Morus*). Discovered by the writer on guava in the Botanical Gardens, Havana, but very scarce.

Paraleyrodes perseæ Quaintance.

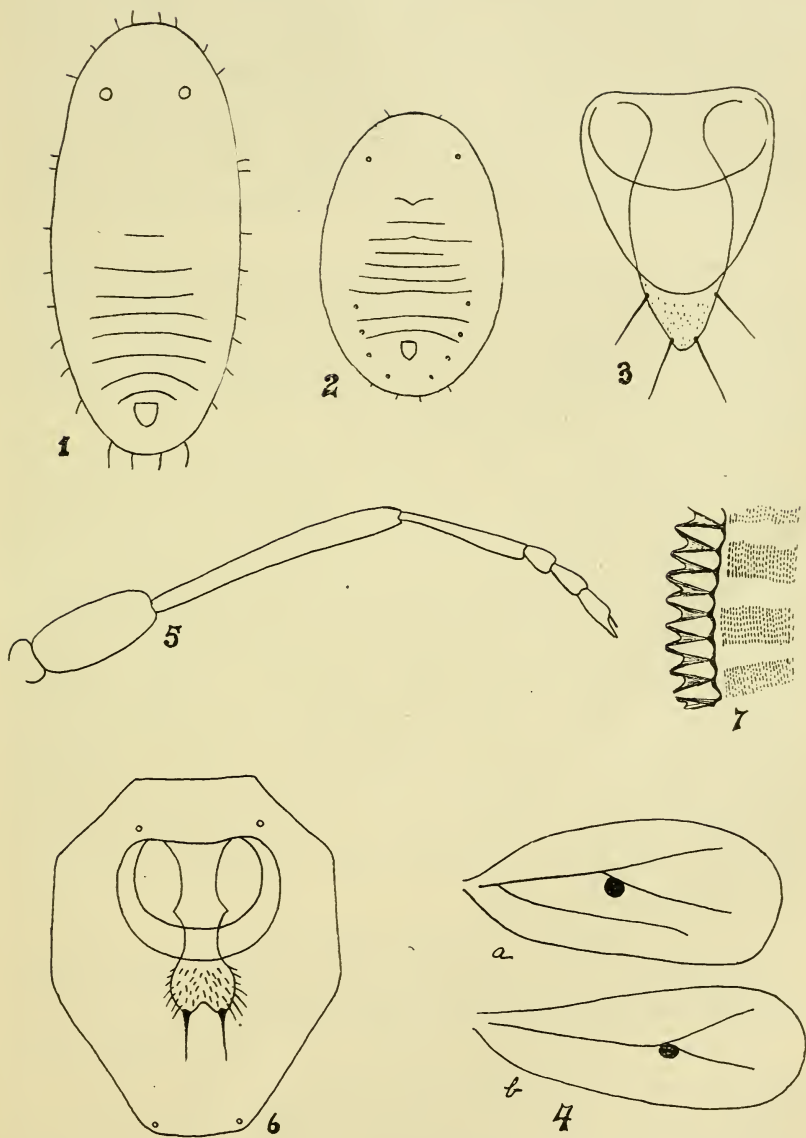
This species, which has previously been reported as infesting *Persea carolinensis*, guava and citrus in Florida, was found on guava at Havana and Santiago de las Vegas in all stages; and while it was not abundant, it was by no means rare.

Aleurodicus cardini, n. sp.

Egg.—About 0.26 mm. long, width about 0.076 mm. Elongate oval, uniformly pale yellowish, unmarked. Pedicle short; egg lying prone on leaf, often entirely surrounded and concealed by fluffy waxen secretions of the adult. Eggs laid without regard to arrangement on leaf.

Larva.—Crawling first instar. (Fig. 1.) Length about 0.319 mm., width about 0.12 mm. Elongate oval, pale yellowish white in colour without darker markings or waxen secretions. Thirteen pairs of marginal spines, short, the posterior two pairs longer; a fourteenth pair located on venter near margin on cephalic end of case. Spine on lower side of distal third of antennæ and terminal spine of antennæ proportionately longer and more distinct than in *A. citri* or *A. nubifera*.

Pupa Case.—(Fig. 2.) Length about 0.94 mm., width about 0.64 mm. Subelliptical, elevated on a vertical marginal waxen fringe. Colour yellowish to yellowish white, after emergence empty case whitish, semi-transparent; parasitized specimens appear blackish either throughout or in spots. Margin entire without pattern of any sort; near margin is a series of wax pores. On venter near margin are eighteen or twenty inconspicuous bristles seen only with high magnification; of these, three pair, one cephalic, and two caudad, are more conspicuous. On dorsum nearer the margin than centre are five pairs of round well defined compound



ALEURISCUS CARDINI, SP. N., AND ALEYRODES TRACHOIDES, SP. N.

pores ; four pairs on abdominal segments and one pair on cephalic region. Cephalad of vasiform orifice is a pair of minute bristles. Vasiform orifice elongate cordate (Fig. 3), about 0.09 mm. wide at base, and about 0.1 mm. long from base of operculum to tip of lingula ; cephalic margin straight, caudal and evenly rounded. Operculum subelliptical nearly one-half as long as orifice. Lingula broad, extending well beyond caudal end of orifice, on distal fourth which usually lies beyond caudal end of orifice with two pairs of comparatively long setæ. Rudimentary legs and antennæ as usual.

From wax pores on dorsum, there may be frequently seen protruding white glistening waxen rods which frequently break off and fall about the pupæ as in *P. perseæ*. The dorsal surface of case usually becomes, especially towards maturity, well dusted with a thin coating of white secretions, and at times a very narrow, downwardly directed marginal fringe may be seen outside the vertical fringe.

Adult.—Length, ♂, about 1.16 mm. Forewing, ♀, 1.39 mm. by 0.62 mm.; length *hind femur*, 0.26 mm. Length hind tibia, 0.35 mm.; length hind tarsi, 0.18 mm.; length claws, 0.08 mm.; ♀ proportionately larger. Yellow, covered with whitish waxen secretions; eyes red, not divided, but distinctly constricted. A line extending along side of head, interrupted by upper portion of compound eye, the lateral callosities of prothorax, indistinct traces along suture of proximal segments of abdomen, and portions of vasiform orifice, all blackish. Wings beautifully iridescent, with deep violet reflections, a small prominent round brownish spot about 0.06 mm. in diameter (Fig. 4) on each fore and hind wing just behind the posterior distal branch of vein, usually enveloping vein but never filling the angle between veins as shown in *A. mimos* (Tech. Bull. 8, Div. Ent., Dept. Agric., Pl. VI, Fig. 6), wings otherwise unmarked. Antennæ (Fig. 5) seven jointed, the comparative lengths of the various segments as follows :

$$\text{Segments } \frac{1}{20}, \frac{2}{6}, \frac{3}{137}, \frac{4}{8}, \frac{5}{1.5}, \frac{6}{2.5}, \frac{7}{2.4}$$

Segments 3 to 7 show usual corrugations ; segment 7 with constriction on distal half at which point is borne a distinct bristle.

Habitat.—Type material collected at Havana and Santiago de las Vegas, Cuba, in November, 1910, by the writer.

Food Plant.—Guava, *Psidium guajava radii*.

Type.—Type material in collection of the U. S. D. A., Bureau of Entomology, and in that of the writer.

This species is really distinguished by its iridescent wing on which the spots described stand out prominently. It differs superficially from *iridescens* in having a spot on the hind wings and in colour of pupa case; from *minima* it differs in having no appreciable clouding of wings other than the spots described, in shape and location of the spots, and in the pupa case having but five instead of seven pairs of wax pores. The darkened portions of the vasiform orifice appear as a dark spot on the untreated adult. In crawling about the leaf, the female leaves behind a line of fine fluffy waxy secretion rubbed from a tuft of the same developing on the under side of her abdomen. Frequently her path can be distinctly followed by the aid of these lines of secretions. In mating, the sexes head in the opposite direction, and in this respect differ from those species of *Aleyrodes* that have come under the observation of the writer.

This species becomes quite abundant on the Guava at times, and when not parasitized becomes a nuisance. In November, 1910, it was causing noticeable blackening of the foliage at Santiago de las Vegas. The species is, however, heavily parasitized by a hymenopterous parasite and the red fungus (*Aschersonia aleyrodis*) which the writer found generally present on affected leaves. Prof. Patricio Cardin, for whom this species is named, sent the writer specimens in May, 1911, over 90% of which had been parasitized by a hymenopterous parasite. This is the species of White-fly figured by Cook and Horne as an undetermined aleyrodid on guava (Pl. XV, fig. 41, Bull. 9, Estacion Central Agronomica de Cuba), and beyond doubt is that referred to in the Primer Informe Annual of the same station as "Guagua a mosca blanca de la guayabo." Cook and Horne (l.c., p. 31), say that *Aleyrodes howardi* is the species referred to, but in this they are apparently mistaken, as the writer has not found *howardi* except very rarely on guava. While *howardi* was generally present on orange trees close by, this species was found only on guava.

Aleyrodes trachoides, n. sp.

Egg.—About 0.2 mm. long. Pale in colour, smooth, without reticulations or waxy secretions; curved with convex side approximating leaf, attached by short stalk arising from convex surface, about one-fourth distance from base to tip of egg. Eggs deposited promiscuously about lower surface of leaf.

Larva, crawling first instar.—Length about 0.27 mm., width about 0.14 mm.; elongate elliptical, yellowish white, with nine pairs of marginal bristles and one pair cephalad on venter near margin; the anterior and two posterior pairs of marginal bristles longest.

Pupa case.—Length about 0.83 mm., width about 0.5 mm. Sub-elliptical in shape, many specimens with more or less evident indentures on cephalo-lateral margin of case. Black, with whitish mealy waxen secretion on dorsum, not abundant enough to entirely obscure colour of case; case with conspicuous lateral waxen fringe of a cottony nature, averaging about one-half in length the width of the case. Along the dorsimeso is a distinct elevation extending cephalad from and including the vasiform orifice to near the margin of the case, reduced to a mere ridge on thoracic region, but broader and evenly rounded on the abdominal region, and merging caudad into a more or less octagonal rim around the vasiform orifice. (Fig. 6.) Abdominal segments distinct, extending outward, but slightly beyond the rounded keel. Dorsum with three pairs of stout bristles; one on the mesothorax, one just cephalad of orifice and one at posterior end of keel. Two pairs of minute marginal bristles present; one cephalad, and one caudad. Marginal rim distinct, with colourless wax tubes distinct; wax tubes elongate, more or less rounded, some acute, incisions obtuse or acute. Between margin of case and line marking outer limits of pupa within is a series of dark elongate strictions parallel to case margin. (Fig. 7.) Vasiform orifice (Fig. 6), sub-semicircular, distinctly broader than long; operculum sub-semicircular, broader than long, reaching about $\frac{2}{3}$ distance from base to tip of orifice. Lingula fully developed, reaching well beyond the caudal margin of orifice, consisting of a basal shaft and expanded tip; shaft acutely enlarged midway; tip nearly circular, with distinct constriction distally and armed distally with a pair of comparatively long weak bristles and numerous short hairs. Lingula seen with great difficulty, except in case pupal skins protruding from pupa case.

Adult.—Female dried specimen, about 0.8 mm. long, fore wing about 0.96 mm. long, posterior femur 0.2 mm. long, posterior tibia 0.3 mm. long, posterior tarsi 0.1 mm. long. Adults yellowish, without darker markings, after emergence becoming thoroughly coated with whitish secretions, eyes reddish, constricted at middle, but not divided; wings with typical *Aleyrodes* venation, whitish, without spots or clouds, slightly violet. Males do not differ from females except in usual characteristics.

Habitat.—Type material collected at Santiago de las Vegas, Cuba.

Food Plant.—Indigenous solanaceous vine, *Solanum seaphorthianum* Andr. (Dr. Cauizares authority.)

Type.—Type material in collection of U. S. D. A., Bureau of Entomology, and in that of the writer.

This species is closely related to *Aleyrodes tracheifer* Quaintance, and runs to this species in the key (Technical Series, No. 8, Div. of Ent., U. S. Dept. Agric.). It differs, however, in that the wax marginal fringe is not as wide, that the marginal wax pores are more even, in the shape of the rim about the vasiform orifice, and in the development of the keel on the dorsum. In *tracheifer* this keel is narrow and of even width throughout, except for certain constrictions which produce an "arrow-shaped" effect anteriorly. In *trachoides* this keel is a mere ridge on the thoracic region, but very much broader on the abdominal regions. The lingula of *tracheifer* is very small and poorly developed as compared with that of *trachoides*.

Described from an abundance of material collected by Prof. P. Cardin, who states, that although extremely abundant (quite coating the under surfaces of leaves affected), no sooty mold (*Meliola*) follows its attack. Prof. Cardin is also authority for the statement that when abundant this species causes the foliage to fall.

EXPLANATION OF PLATE VIII.

Fig. 1. *Aleuriscus cardini*.—Crawling young, dorsal view.

Fig. 2. *A. cardini*.—Pupa case, dorsal view.

Fig. 3. *A. cardini*.—Vasiform orifice.

Fig. 4. *A. cardini*.—*a*, fore wing; *b*, hind wing.

Fig. 5. *A. cardini*.—Antenna.

Fig. 6. *Aleyrodes trachoides*.—Vasiform orifice and rim about same, circles showing location of 7 spines.

Fig. 7. *Aleyrodes trachoides*.—Margin of pupa case, enlarged.

APHID NOTES FROM OREGON.

BY H. F. WILSON, CORVALLIS, OR.

In a general study of the plant lice of Oregon, we have found abundant material in many old and some new species. We are making an effort to clear up the life history of a number of them and the present paper is the first of a series which we hope to get out, giving all stages of as many species as possible.

Illinoia osmaroniae, n. sp.

This quite large aphid is found on the leaves of *Osmaronia cerasiformis* and is quite abundant about Corvallis, Oregon.

May, 1912

Stem-mother.—On March 18, 1911, the stem-mothers of this species, with newly-born young, were plentiful in the just opening leaf buds of the host plant.

General colour light green throughout with legs and antennæ slightly paler green. Body large and robust. Antennæ about two-thirds the length of body and quite slender. Nectaries quite slender and about one-fourth as long as the body. Cauda short and triangular in shape.

Measurements: Length of body, 3.33 mm.; width, 1.8 mm. Length of antennal segments, I, 0.135; II, 0.04; III, 0.7; IV, .33; V, .38; VI, .2; spur, .51 mm.; total length, 2.295 mm. Length of nectaries, .73 mm. Length of cauda, 0.22 mm.

Spring Migrant.—April 25th; what is probably the third generation of this species found abundantly on under side of leaves; numerous young present.

General colour light green; head and thorax orange; antennæ with six segments; spur of sixth as long or longer than third segment; sixth segment and spur dusky and basal two-thirds of third segment also dusky; legs light green except distal end of tibia and tarsi, which are nearly black. Wings hyaline and large. Nectaries long and cylindrical, slightly constricted at tip. Cauda large, slightly turned up and blunt at point. Third antennal segment with from 24 to 28 small, irregularly-placed sensoria, most of them scattering. Antennal tubercles large and distinct, and strongly gibbous; at upper inner edge two bristle-like hairs at highest part. First segment large and strongly gibbous; second segment small in comparison.

Measurements: Length of body, 2.88 mm.; width, 1.22 mm. Length of antennal segments, I, .176; II, .09; III, 1.11; IV, .84; V, .75; VI, .26; spur, 1.11 mm.; total length, 4.336 mm. Length of wing, 5.7 mm.; total expanse, 12.4 mm. Length of nectaries, 1 mm. Length of cauda, .44 mm.

Fall Migrant.—Oct. 11; winged individuals not very common and producing young on leaves of *Osmoronia* about Corvallis.

General colour green with head and thorax orange coloured. This form resembles the previous form entirely, except in the antennæ and size, the fall migrant being slightly smaller, and the third segment of the antennæ bears from 18 to 22 regularly placed round sensoria lying in a straight line along the outer edge.

Oviparous Female.—The egg-laying female is orange-green in colour, and is quite small in comparison with the stem-mother. The legs are a

little lighter in colour than the rest of the body and the antennæ are slightly dusky at tip. Antennæ longer than the body and placed on large tubercles.

Measurements: Length of body, 2.33 mm.; width, 1 mm. Length of antennal segments, I, .11; II, .066; III, .4; IV, .33; V, .38; VI, .154; spur, .82 mm.; total length, 2.26 mm. Length of nectaries, .73 mm. Length of cauda, .33 mm.

Egg.—The eggs are deposited on the shoots at the base and on the under side of the buds. No measurements of the eggs were secured. They are very similar to other species in this group, although smaller than one would expect for the size of the insect. When first deposited they are light greenish yellow and later become deep shining black.

Alate Male.—Collected on underside of leaves November 3rd, 1911. General colour light yellow. Head, thorax, legs and antennæ dusky to black. Two basal segments of antennæ and basal half of femora yellow. Abdomen with six transversal bands broken in half, four in front of base of nectaries and two behind. Cauda of medium length, tapering and blunt at the tip. Antennal tubercles large and very distinct, being slightly gibbous on upper inner edge; first antennal segment large and strongly gibbous on inner side, second segment quite small in comparison. The third, fourth and fifth antennal segments with an irregular row of small widely separated circular sensoria on each segment. They vary from 18 to 26 on each segment.

Measurements: Length of body, 2.66 mm.; width, .9 mm. Length of antennal segments, I, .135; II, .066; III, 1.02; IV, .8; V, .8; VI, .198; spur, 1.29 mm.; total length, 4.299 mm. Length of wing, 5.95 mm. Total wing expanse, 12.85 mm. Length of nectaries, 7 mm. Length of cauda, 3 mm. The penis of this form is easily forced out by a little pressure on the abdomen.

Illinoia macrosiphum, n. sp.

First collected about Corvallis, Oregon, on *Amelanchier alnifolia*, July 4, 1911. Found in small colonies and not very plentiful. General colour whitish yellow. The specific name *macrosiphum* is applied on account of the extremely long nectaries. In the very young these are as long as the body, in the mature specimens they are $\frac{1}{2}$ to $\frac{2}{3}$ the length of the body. An effort was made to secure the winged forms of this species, but none were found excepting the alate male of what is supposed to be the same species collected on rose November 3, 1911, and on *Amelanchier*

bushes the last of September. These last specimens measure in length, from forehead to tip of cauda, 2 mm., while the nectaries measure from base to tip 1.78 mm. Antennæ reaching to tip of nectaries. Comparative lengths of segments can be obtained from measurements. Antennæ except basal segment slender, basal segment very large in proportion to the others. Legs quite long, nectaries large at base and tapering, each long and ensiform.

Measurements: Length of body from forehead to base of cauda, 2 mm.; width, .85 mm. Length of antennal segments, I, .176; II, .09; III, .82; IV, .622; V, .644; VI, .176; spur, 1.29 mm.; total length, 2.818 mm. Length of nectaries, 1.622 mm. Length of cauda, .33 mm.

Oviparous female resembles the viviparous female, except in the colour of the body, which is rosy red.

Alate Male.—What we supposed to be the males of this species were collected on wild rose bushes under *Amelanchier alnifolia*.

General colour green with rosy tint; five transverse bands may be found on the abdomen. These are broken so as to appear like ten spots. Head and thorax dusky. Antennæ except first two segments dusky. Legs with dusky joints and tarsi. Nectaries dusky, cauda rosy coloured. Third segment with numerous small sensoria; fourth with about thirty; fifth with about twenty. A very interesting character of this species is found in three small sensoria on the sixth segment besides those at the base of the spur. One of these may be found at each end of the segment and the third lies midway between.

Measurements: Length of body from forehead to base of cauda, 1.066 mm.; width, .52 mm. Length of wing, 2.71 mm.; width, 1 mm.; total wing expansion, 5.93 mm. Length of antennal segments, I, .11; II, .045; III, .6; IV, .49; V, .58; VI, .135; spur, 1.174 mm.; total length, 2.134 mm. Length of nectaries, .75 mm. Length of cauda, .198 mm.

Myzus rhamni Boyer.

Syn. *Macrosiphum rhamni* Clarke.

This species is very abundant about Corvallis on *Rhamnus purshiana*. The entire development is apparently passed on this plant as they were present throughout the year. I have not seen specimens of Clarke's *Macrosiphum rhamni* and repeated efforts to locate the types, if there are any, were unsuccessful. From the description I am led to believe that the California species is the same as the one found in Oregon, and there

seems little doubt but that the Oregon species is the same as the one described by Boyer.

Stem-mother.—The first stem-mothers were collected on the 23rd of March and at that time they were about full grown.

General colour light green. Antennæ towards tips dusky; distal end of tibiæ and tarsi dusky. In this stage the characters resemble those of *Aphis* more than anything else. The antennæ are stout and measure less than one-half the length of the body. The legs are short and the antennæ and cauda are as in *Aphis*. Antennal tubercles distinct, but not long.

Measurements: Length of body from forehead to tip of cauda, 2.65 mm.; width, 1.30 mm. Length of antennal segments, I, .154; II, .066; III, .33; IV, .242; V, .27; VI, .11; spur, .44 mm.; total length, 1.612 mm. Length of nectaries, .5 mm. Length of cauda, .176 mm.

Viviparous apterous female of the summer generations collected June 4th, 1911, on underside of leaves of tree on college campus; pupa and alate forms also present.

General colour light green or lemon-yellow throughout, but the characters are like those of *Myzus*, and this form is quite distinct from the stem-mothers. The antennæ are quite long and slender and placed on prominent tubercles. First antennal segment strongly gibbous on inner side. Sixth antennal segment and spur almost setaceous in form. For comparative lengths see measurements. Legs rather stout, short and sparsely hairy. Nectaries thick at the base and slightly tapering with a slight inward curve. Cauda medium in length and blunt at the tip.

Measurements: Length of body, 2.5 mm.; width, 1 mm. Length of antennal segments, I, .135; II, .09; III, .778; IV, .55; V, .51; VI, .154; spur, .98 mm.; total length, 3.197 mm. Length of nectaries, .778 mm. Length of cauda, .154 mm.

Spring Migrant.—Collected on underside of leaves June 4th, 1911.

General colour lemon-yellow. Head and thoracic shield light orange. First two antennal segments green, the base of the third green, remainder of antennæ dusky to black. Basal half of nectaries green to dusky, outer half darker to black. Some specimens with an orange spot in the centre of the body just back of the thorax. Antennæ long and slender and placed on prominent tubercles. First segment large and strongly gibbous on the under side. Second segment small. Third segment with about twenty-five nearly circular sensoria of variable sizes and irregularly placed. Frontal tubercle of head quite prominent. Legs long and slender.

Nectaries long, slender and slightly curved in at middle. Cauda of medium length, bluntly pointed.

Measurements : Length of body, 2.48 mm.; width, .95 mm. Total wing expanse, 8 mm.; length of wing, 3.8 mm. Length of antennal segments, I, .15 ; II, .1 ; III, .85 ; IV, .56 ; V, .55 ; VI, .2 ; spur, 1.1 mm.; total length of antennæ, 2.51 mm. Nectaries, .78 mm., and cauda, .15 mm.

Fall Migrant.—This form so nearly resembles the above as to make a second description unnecessary.

Oviparous Females.—Taken on leaves and in the act of oviposition along young shoots, November 1, 1911 ; present until a late frost in November.

General colour green. First two antennal segments and basal half of third and legs, except tarsi, light green, remaining parts of antennæ and tarsi dusky to black. Other characters and measurements taken from specimens mounted in balsam. Antennal tubercles strong and prominent. First antennal segment large, remaining segments long and slender. Antennæ medium length and with decided *Myzus* characters, being slightly curved in and having the constricted tips. The portion of the abdomen back of the nectaries large and extending back nearly to the end of the nectaries. Cauda short and blunt.

Measurements : Length of body, 2.25 mm.; width, 1 mm. Length of antennal segments, I, .135 ; II, .066 ; III, .58 ; IV, .49 ; V, .4 ; VI, .11 ; spur, .55 mm.; total length, 2.331 mm. Length of nectaries, .71 mm.; length of cauda, .11 mm.

Alate Male.—Collected with oviparous females and alate viviparous females on underside of leaves, Nov. 1st and 3rd, 1911.

General colour green. Antennæ with first two segments and base of third light green ; remaining segments, with distal half of femora and tarsi, dusky, other parts of less green. Nectaries light dusky at base, shading into black at tip. Antennæ on prominent tubercles and with first segment large and gibbous. Third and fourth segments with numerous slightly-raised sensoria, fifth with about eight slightly larger sensoria on outer edge and in a row. Wings large and venation regular. Legs long, femora stouter than in alate females. Nectaries shorter than in females, but with *Myzus* characters. Cauda of medium length, not tapering and quite blunt at the tip.

Measurements : Taken from specimens preserved in balsam. Length

of body, 1.174 mm.; width, .4 mm. Length of wing, 2.15 mm.; total wing expansion, 4.60 mm. Length of antennal segments, I, .066; II, .047; III, .44; IV, .34; V, .33; VI, .09; spur, .622 mm.; total length, 1.935 mm. Length of nectaries, .242 mm. Cauda, .11 mm.

Eggs deposited on young twigs about base of buds.

(To be continued.)

NOTES ON SOME NORTH AMERICAN TINEINA.

BY ANNETTE F. BRAUN, UNIVERSITY OF CINCINNATI.

Argyresthia annettella Busck.

Argyresthia annettella Busck, Proc. U. S. Nat. Mus., XXXII, 12, 1907.

The larvæ of this species mine the leaves near the tips of the twigs of the Juniper (*Juniperus communis* L.). The leaf, except at its extreme tip, is reduced to a mere shell, containing a few scattered grains of excrement, as may be seen by holding the twig toward the light. In this manner each larva excavates about four leaves, passing from one to another through the stem. The mines are started in summer, and the larvæ winter within the mines, leaving them to pupate in May. The mined leaves later become discoloured, and ultimately the entire end of the twig dies. Where the miners are abundant, the numerous brownish dead ends of the twigs give evidence of their presence. The cocoon, which is an open meshwork of coarse silk, is attached to the upper side of a leaf near the mine. The imagoes appear during the early part of June.

Although the Juniper is widely distributed around Cincinnati, *A. annettella* seems to occur only in three or four isolated spots, where I have seen as many as 40 or 50 mines upon a single plant about five feet high.

Lithocolletis trinitella Braun.

Lithocolletis trinitella Braun, Ent. News, XIX, 99, 1908; Trans. Am. Ent. Soc., XXXIV, 279, 1908.

Since the original description of this species was published, I have been successful in rearing four specimens from small tent mines on the under side of leaves of Silver Maple (*Acer saccharinum* L.), collected in Clermont Co., Ohio. The mines are extremely small, about 8 mm. long, and much wrinkled at maturity. The pupa is enclosed in a loose web of silk.

The moths, while agreeing in all essential particulars with the types, are somewhat larger, and have a third costal white streak, which is often obscure and entirely unmarginated.

May, 1912

Lithocolletis martiella Braun.

Lithocolletis martiella Braun, Trans. Am. Ent. Soc., XXXIV., 290, 1908.

A single specimen of this species, bred from *Betula lenta* L., at Balsam, N. C., July, 1911, confirms Dr. Dyar's somewhat doubtful record of its food-plant as birch, and gives two widely-separated localities for the species, the type locality being Kaslo, B. C.

The mine, which is placed on the lower surface of the leaf, is elongated, and the loosened epidermis is thrown into a series of fine ridges. The pupa is not enveloped in a cocoon, but the one-half of the mine containing the pupa is sparingly lined with silk.

Lithocolletis betulivora Walsingham.

Lithocolletis betulivora Walsingham, Ins. Life., III, 326, 1891; Braun, Trans. Am. Ent., XXXIV, 339, 1908; Dyar, List N. A. Lep., No. 6328, 1902.

A single specimen of this species was bred from *Betula lutea* Mich., at Balsam, N. C. The pale markings are suffused with yellowish to such an extent that they are scarcely differentiated from the ground colour of the wing, and dark scales are entirely lacking, except external to the pair of spots at the apical third and in the apex of the wing.

Coriscium cuculipennellum Hübner.

Coriscium cuculipennellum Hübner, Ges. eur. Schmett., VIII, Tin., VI, Al. B. f. 2, 1831; Fernald, CAN. ENT., XXV, 96, 1893; Dyar, List N. A. Lep., No. 6401, 1902.

I have found the mines of this species common in the vicinity of Oxford, Ohio, upon the leaves of Green Ash (*Fraxinus lanceolata* Borck.) and White Ash (*Fraxinus americana* L.). The mine, at first very narrow and shining white, begins on the upper side near the midrib, usually following the midrib downward more or less closely for a length of 3-4 cm., thence diverging and slanting outward to the margin of the leaf, where it is scarcely more than .5 mm. wide. Here it enlarges into an elongate white blotch 2-2.5 cm. long and 5 mm. wide. The epidermis in this blotch becomes so much wrinkled that the edge of the leaf is bent over, entirely concealing the mine, except at the extreme ends. The loosened epidermis is everywhere very thin.

The larva later feeds within conically-rolled leaves, and spins the characteristic suspended cocoon within the roll.

Lyonetia latistrigella Walsingham.

Lyonetia latistrigella Walsingham, Trans. Am. Ent. Soc., X, 203, 1882; Busck, Proc. Ent. Soc. Wash., V, 209, 1903; Dyar, List N. A. Lep., No. 6416, 1902.

Two specimens of this interesting species were bred at Balsam, N. C., from mines on *Rhododendron maximum* L. The mines were only observed upon the young tender leaves which had not yet attained their full size. The mine begins as a very fine black line, continuing thus for a length of about 3 cm., after which it becomes noticeably broader for about the same distance, but is still to be considered a linear mine. Beyond this point it rapidly enlarges to a brownish elongate blotch, 4 cm. in length or more, with an average width of 5 mm. The larva leaves the mine to pupate, suspending its naked chrysalis by means of a few silken threads stretched across a bent leaf.

The two imagoes agree closely with Walsingham's description, and exhibit no variation. They are easily distinguished from the allied species by the conspicuous ferruginous patch of scales in the apical fourth of the wing.

TWO NEW SPECIES OF COLEOPTERA FROM ILLINOIS.

BY A. B. WOLCOTT, CHICAGO, ILL.

The two apparently new species herewith described were collected by Prof. Arthur G. Vestal during the course of his biological studies in the Illinois sand region, and, as the result of his investigation will, no doubt, soon be published, it seems desirable that these nondescripts be made known prior to the appearance of his paper.

For the opportunity of describing these beetles I am indebted to Prof. Vestal, who, with rare generosity, likewise gave me the two unique representatives of the following species.

Saprinus illinoensis, sp. nov.

Broadly oblong-oval, strongly convex, shining black; the antennæ dull rufous, the basal joint and the legs rufo-piceous. Head impunctate, strongly margined at sides and apex; surface with a distinct and irregularly eroded chevron. Prothorax twice as wide as long; the sides rather strongly convergent and feebly rounded, more strongly rounded near apex; marginal groove distinct, deep throughout; disk feebly, rather densely rugulose, more feebly so toward middle and obsolete in small area at middle of base, coarsely and deeply but sparsely punctate along the

base. Elytra rounded at the sides, three-fourths longer than the prothorax, and at basal third distinctly wider, finely and not very densely punctate at apex, punctate space extending narrowly along the suture to the middle and not entered by the dorsal striæ; each elytron with a vague impression at middle near sutural striæ; margined stria straight, deep, fine along the apex to suture; outer subhumeral fine, distinctly diverging from the marginal to the middle thence converging and extending very nearly to apex; inner subhumeral distinct from the middle to apical sixth, fragmentary and feeble before the middle; oblique humeral fine and feebly impressed, extending to basal third, not joining the internal subhumeral; dorsal striæ rather fine, broadly arcuate, the first extending to apical fourth, second and fourth to apical third, the third slightly shorter, one to three hooked at base, the fourth broadly arched at base, joining the entire sutural. Propygidium short, sub-impunctate in basal half, the punctures apically rather coarse and dense, but feeble, subcarinate at middle. Pygidium not densely but rather coarsely, feebly punctate. Prosternal striæ abbreviated at apical fourth, rapidly divergent posteriorly; lateral convergent carinæ very distinct; transverse suture punctate. Mesosternum feebly emarginate at apex, coarsely, remotely punctate. Metasternum with a distinctly limited transverse band of coarse, sparse punctures posteriorly. Anterior tibiæ with five subacute erect teeth, the outer three longer and broader.

Length, 4.5 mm.

One specimen, Havana, Ill. "Under a board at the Devil's Hole, July 29, 1910."

This species would by Dr. Horn's table fall with *sphaeroides* J. E. Lec. In size and colour, however, it is nearest the recently described *lakensis* Blatch. It agrees with both these species in having the sutural striæ entire and the dorsals not entering the punctured space. *Illinoensis* may be distinguished by the very distinct chevron of the head, the irregular dorsal striæ, the manner and extent of punctuation of the prothorax and elytra and its somewhat larger size.

Bruchus arenarius, sp. nov.

Form very robust, black, densely evenly cinereo-pubescent.* Head subopaque, finely densely subrugosely punctate; front feebly subcarinate. Antennæ as long as half the body, not conspicuously incrassate externally; second joint slightly longer than wide; black, basal joint red beneath.

*Under a rather high power glass, sparse, evenly distributed, yellowish hairs are discernable; these are not numerous enough, however, to alter the general grayish tone of the pubescence.

Thorax more than twice as wide at base as long ; sides strongly arcuate ; disk moderately convex ; basal lobe broadly rounded ; finely densely feebly punctate. Scutellum small, broader than long, punctured and cinereo-pubescent. Elytra subquadrate, conjointly at middle as broad as long ; sides distinctly arcuate ; disk flattened, finely striate ; striæ finely and feebly punctate ; intervals broad, flat, finely rugosely punctate, each with a series of distant large punctures. Pygidium oblique basally, convex and vertical in apical half ; the tip somewhat inflexed ; rather coarsely, sparsely and feebly punctate, uniformly cinereo-pubescent. Hind femora mutic. Apical spur of hind tibiæ about one-third the length of the first tarsal joint.

Length, 2.25 mm.

One specimen, Havana, Ill. "On the sand, between tufts of bunch-grass at the Devil's Hole, April 9, 1911."

This species belongs to group IV of Prof. Fall's table, where it would seem to be placed best immediately after *leucosomus* Sharp. The small size of this species, in connection with its entirely black colour, uniform, not variegated pubescence and absence of spots of pygidium, renders it easily recognizable.

BASILARCHIA WEIDERMEYERII ANGUSTIFASCIA,
A NEW GEOGRAPHICAL RACE.

BY WM. BARNES, M.D., AND J. MCDUNNOUGH, PH D., DECATUR, ILL.

A series of 2 ♂s and 5 ♀s, collected last summer in the White Mts., Arizona, differs from the typical form from Colorado and Utah, as depicted by Edwards (Vol. I, pl. 42), in that the median white band is much reduced in width, and the intersecting veins, especially on the primaries, are more broadly black. This difference is most noticeable in the ♀s, the band on the primaries being distinctly broken up into an irregular row of white semiquadrate spots, of which the third from the costa is greatly reduced in size ; on the secondaries the spots are *not* broader than long. As this feature is remarkably constant in all the specimens before us, and as, furthermore, we have had for years a ♀ labelled Arizona in the collection which shows the same peculiarities, we consider a varietal name for the Arizona form warranted ; the extreme form of this race, in which the white band has entirely disappeared, is the ab. *sinefascia* Edw., also from Arizona. The males are normal in size, having a wing expanse of 2½ in. (63 mm.) ; the females are somewhat larger than usual, all our specimens measuring 3 in. (60 mm.). The types are in coll. Barnes.

GEOMETRID NEWS—DESCRIPTIONS OF TWO NEW
HYDRIOMENAS.

BY L. W. SWETT, BOSTON, MASS.

Hydriomena henshawii, nov. sp.

Palpi short ; expanse of wings 35 mm.

Colour of fore wings light ash-gray, speckled with black atoms ; the space between the basal line and body of the same colour. Basal line bent outwardly from body at vein Sc. (Smith's Glossary), then curved slightly inwardly toward body, the curve ending quite a distance out on inner margin with a black dash ; mesial space gray, with black atoms ; median band black and irregular ; intradiscal line running from costa to inner margin almost diagonally, with irregular curves between the veins ; mesial or discal space with a faint spot ; extradiscal line black, starting in a dash at costa, then curved outward with irregular points, as in *autumnalis* ; outer margin pale gray with black atoms, the usual watery black band curved more regularly than in *autumnalis*. Fringe long, pale gray, with double points at base of fringe.

Hind wings pale gray, with the usual two faint extradiscal bands.

Beneath, the discal points on the fore wings are represented by two pale dashes, the lines above showing through faintly. The dots on the hind wings beneath are round ; beyond, the two pale gray lines show through from above. The fringe is long and pale ash-gray, as above.

Type, 1 ♂, Nevada, Museum of Comparative Zoology, Cambridge, Mass. I take pleasure in naming this species after my kind friend, Mr. Samuel Henshaw, who has assisted me much in my work on the Hydriomenas.

This species resembles slightly *H. quinquefasciata* Packard.(To be continued.)

EXTENSIVE infection of the San José scale has been discovered on trees in the southern part of Wisconsin by Professor J. G. Sanders, of the University of Wisconsin. Professor Sanders, who is also State Nursery Inspector, reports that steps are being taken to control the pest and prevent its spreading beyond the area affected already.—[*Science*.]

Mailed May 8th, 1912.

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No. 6

SOME PARASITIC BEES (*COELIOXYS*).

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO, BOULDER.

Coelioxys moesta Cresson.—Peachland, B. C., Aug. 9, 1909 (J. B. Wallis, a53). ♀.

Coelioxys deplanata Cresson.—Wawawai, Wash., Aug. 30, 1908 (W. M. Mann). Both sexes.

Coelioxys rufitarsis Smith.—Four females, Wawawai, Wash., Aug. 30 and Sept. 6, 1908 (W. M. Mann).

Coelioxys immaculata, n. sp.—Male; Miners, Indiana, July; collector unknown, but there is a label bearing the number 1525.

Length a little over 10 mm., robust, black, with rather dull white hair, faintly creamy on upper part of head; eyes pale green, with abundant quite long hair; antennæ and mandibles entirely black; tegulæ bright apricot colour; femora except the lower side, and tibiæ and tarsi entirely, bright ferruginous, as also are the tibial spurs; hair on inner side of basitarsi creamy; head and thorax with dense, large punctures, those of vertex larger than those on mesothorax; lower part of cheeks with a broad bevelled space, which is shining and punctured; thorax above without the usual white hair patches; scutellum broadly rounded behind, without any median projection; lateral teeth thick, not curved; abdomen shining, but well punctured, the second and third segments with deep transverse constrictions; fourth ventral segment with a weak emargination; sides of fifth segment with very short spines; sides of sixth with large thick spines; end of sixth with four teeth, the upper ones short, and directed obliquely upwards, the lower large and unusually broad. In Robertson's table (Trans. Amer. Ent. Soc., XXIX, p. 174), this runs out at 3, because of the red legs, punctured bevelled space, etc. Robertson says of male *octodentata*, "disc of abdomen opaque, densely punctured"; *immaculata* has the abdomen very conspicuously shining, except the sublateral region of the second segment just beyond the sulcus, which is dull and very densely covered with minute punctures, in complete contrast with the corresponding areas on the first and third, and with the sparsely-punctured middle of the second.

Coelioxys grindeliæ denverensis, n. subsp.—Four males; Denver, Colorado, Aug. 6 to 25, 1908 (Mrs. C. Bennett). Eyes light red (green in *C. grindeliæ* Ckll.); fourth ventral segment strongly emarginate (entire in *grindeliæ*). Otherwise they seem about the same. Face densely covered with white hair; antennæ entirely black; bevelled space on cheeks rugose but shining; anterior coxæ with large flattened spines; tegulæ black, the margin sometimes dark reddish; legs black, including tarsi; spurs dark; second abdominal segment on each side sublaterally with a more or less evident but small shining raised area; teeth on each side of scutellum long; teeth at sides of sixth abdominal segment long; lower apical teeth of abdomen not broad. In Robertson's table this runs out at 3, although the first abdominal segment is very hairy at sides, and sublaterally has distinct indications of a basal band. The anterior part of the mesothorax is conspicuously but diffusedly hairy, instead of having well-defined spots as in *C. deplanata*.

Coelioxys angelica Cockerell.—The male, previously unknown, has been taken by Mr. F. Grinnell, jr., in Strawberry Valley, San Jacinto Mts., California, alt. 6,000 ft., July 18. By its small size and general appearance, it closely resembles *C. deani* Ckll., but the sulcus on the last abdominal segment is much broader. It agrees with the female *angelica* in having a series of large pits along the basal margin of the mesothorax. The anterior coxæ have short spines.

Coelioxys texana vegana, n. subsp.—Beulah, New Mexico, 8,000 ft., August, (Cockerell). I had erroneously placed this with *C. moesta*. It differs from *C. texana* as shown in the table; by the black legs, with red only at the apices of the joints, it resembles *C. alternata* Say. It differs from Say's description of *alternata* by the dark chestnut-red tegulæ, and the total absence of any white hair band bordering the mesothorax, though there is a little tuft of hair just before the axillæ. The abdomen is sparsely punctured, as in *texana*; the fourth ventral segment has slender apical spines.

Coelioxys erysimi, n. sp.—Male at flowers of *Erysimum parviflorum*; Rifle, Colorado, July 3 to 8 (S. A. Rohwer).

Length about 10 mm.; black, with white hair, abundant on head and thorax; tegulæ black; legs entirely black; hind spurs red; eyes pale green, with long hair; antennæ and mandibles black; cheeks hairy all over; vertex, mesothorax and scutellum with large, quite dense, punctures; scutellum rounded behind; axillar spines moderately long, obtuse; wings

strongly dusky at apex; nervures dark; anterior tibiae, and all the tarsi, with short fulvous hair on inner side; abdomen shining, strongly, not densely, punctured; apical hair-band on first segment dense and entire, the other apical bands successively thinner, except at sides, beyond the second segment hardly appreciable dorsally; transverse sulci on second segment oblique; a short white subbasal band at sides of second segment; on segments 3 to 5 very strong subbasal hair-bands, broadly interrupted in the middle; sixth segment deeply excavated in middle, the upper apical margin with seven short teeth, a broadly triangular median one, and three on each side; at the lower apical level are the usual two teeth, long and sharp, about one mm. apart; at the sides of the sixth segment the teeth are very long and sharp, but at the sides of the fifth are no teeth, although very minute tubercles can with difficulty be seen; fourth ventral bidentate.

Coelioxys quercina, n. sp.—Male; Oak Creek Cañon, Arizona, 6,000 ft., August (F. H. Snow, 1974).

Length, 11 mm. or rather over; black, with white hair; tegulae clear red; mandibles black; antennae black, the flagellum faintly brownish beneath; anterior femora above, in front and at apex, middle and hind femora at apex, tibiae (the hind ones broadly suffused with blackish on outer side) and tarsi bright ferruginous; spurs red; eyes light green, with short hair (about half as long as in *C. erysimi*); thorax above with the usual large punctures; scutellum rounded behind; axillar spines long and straight; pits at base of metathorax minute and obscure; abdomen with a strong apical hair band on first segment, the others successively weaker, as in *C. erysimi*; first segment with a basal band; the others with interrupted basal or subbasal bands, becoming successively stronger, broader and less interrupted, that on the fifth almost entire; fifth segment not toothed at sides, sixth with well-developed sharp lateral teeth; apex formed as in *C. erysimi*, but the teeth are smaller; fourth ventral bidentate.

Coelioxys fragariae, n. sp.—Male; Strawberry Valley, San Jacinto Mts., California, 6,000 ft., July 17 (F. Grinnell, jr.).

Length about $10\frac{1}{2}$ mm. (abdomen extended); black, with white hair; tegulae bright red, with a tuft of white hair in front; mandibles and antennae black; legs black, the tarsi and spots at apices of femora and tibiae rather dark red; eyes pale greenish-ochreous, the hair short, as in *C. quercina*; head and thorax above with the usual large punctures;

anterior border of mesothorax with the two hair patches distinct; scutellum not tuberculate in middle; axillar spines large, slightly curved; base of mesothorax without conspicuous pits; wings darkened apically; first r. n. meeting first t. c.; abdomen with hair bands as in *C. quercina*; apical structures of the same type as in *C. quercina*, but the median spine large; fourth ventral bidentate.

Coelioxys hirsutissima, n. sp.—Male; Kenworthy, San Jacinto Mts., Calif., 5,000 ft., June 8 (F. Grinnell, jr.).

Length about $8\frac{1}{2}$ mm. (abdomen retracted); black, with white hair, abundant on head and thorax, and forming entire apical bands (but no subbasal ones) on all the abdominal segments; eyes light green, with long hair, as in *C. erysimi*; antennæ black; apical half of mandibles red; tegulæ red; legs red, with white hair; cheeks hairy; scutellum not tuberculate in middle; axillar teeth rather short; fifth abdominal segment without lateral spines, sixth with slender lateral spines; apex quadridentate, the two lower teeth broad, hardly so far apart as the length of one, slightly curved inwards; ventral hair bands very dense; ventral segments with numerous fine punctures, producing a rather rugose effect, wholly different from the smooth surface, with scattered strong punctures, of the venter of *C. erysimi*, *quercina* and *fragariae*.

The following table compares the above-described species with various other male *Coelioxys*:

- | | |
|--|--------------------------|
| Abdominal bands bright orange-ferruginous, confined to the apices of the segments; no median tooth in apical emargination of abdomen (Assam)..... | <i>turneri</i> Ckll. |
| Abdominal bands not orange or red | 1. |
| 1. Apex of abdomen red, each apical lobe strongly tridentate; anterior coxæ without spines (Willowmore, Cape Colony; (<i>Brauns</i>)..... | <i>afra</i> Lepeletier. |
| Apex of abdomen not red..... | 2. |
| 2. Apex of abdomen multidentate, each lobe with more than two teeth. 3. | |
| Apex of abdomen quadridentate, or quinquedentate by reason of a small median tooth..... | 8. |
| 3. Segments 2 to 5 with hair bands at apex only; mandibles red (Willowmore, Cape Colony; <i>Brauns</i>)..... | <i>difformis</i> Friese. |
| Segments 2 to 5 with basal or subbasal hair bands, interrupted in middle; mandibles black; fourth ventral segment strongly bidentate apically; anterior coxæ with conical, stout, rather short spines; hind spurs red..... | 4. |

4. Tegulæ black ; lower part of cheeks covered with hair ; axillary spines rather long (Colorado) *erysimi* Ckll.
Tegulæ red 5.
5. Sides of middle of mesothorax very densely punctured ; lower part of cheeks covered with hair 6.
Sides of middle of mesothorax with well-separated punctures ; lower part of cheeks bare, bounded behind by a very strong keel ; axillary spines very short 7.
6. Face broader ; anterior tibiæ, all the tarsi, and other parts of legs bright ferruginous ; median apical spine of abdomen very small (Arizona) *quercina* Ckll.
Face narrower ; legs black, with the small joints of tarsi and apices of femora and tibiæ dark red ; median apical spine of abdomen very long (California) *fragariæ* Ckll.
7. Fifth abdominal segment with small lateral spines ; hair of face white (New Mexico) *texana*, subsp. *vegana* Ckll.
Fifth abdominal segment without lateral spines ; hair of face with a yellowish tint (Washington Co., Wis.; *Graenicher*). *texana* Cresson.
8. Tegulæ entirely bright red ; leg red 9.
Tegulæ black, or dull and dark red 12.
9. Lower apical teeth of abdomen long and slender 10.
Lower apical teeth of abdomen broadened ; thorax above without hair spots 11.
10. Ventral surface of abdomen densely and very coarsely punctured (Boulder, Colorado) *edita* Cresson,
Ventral surface of abdomen shining, with widely-separated punctures (Falls Church, Va.; *Banks*) *sayi* Robertson.
11. Larger ; lower apical teeth of abdomen more widely separated ; second s. m. receiving recurrent nervures about equally distant from base and apex *immaculata* Ckll.
Smaller ; lower apical teeth of abdomen less widely separated ; first r. n. joining second s. m. very near base, very much nearer than second r. n. to apex (California) *hirsutissima* Ckll.
12. End of abdomen narrow and elongated, with a deep parallel-sided sulcus above ; lower apical teeth very sharp ; hind spurs red ; very small species (Boulder, Colorado) *deani* Ckll.
End of abdomen broader, the median sulcus broadened 13.
13. Legs bright red ; anterior coxæ strongly spined 14.
Legs black, or the tarsi red 15.

14. Sixth segment of abdomen, in lateral view, not much longer than high (Wawawai, Wash.).....*deplanata* Cresson.
Sixth segment of abdomen, in lateral view, very much longer than high (Willowmore, Cape Colony ; *Brauns*).....*penetratrix* Smith.
15. All the apical teeth of abdomen (including lateral ones) very short and blunt ; spines of anterior coxæ strong, covered on outer side with snow-white hair ; fourth abdominal segment with a subbasal hair band in the transverse sulcus (New Mexico)....*soledadensis* Ckll.
Apical teeth of abdomen at least partly elongated or sharp... ..16.
16. Fourth ventral segment emarginate.....17.
Fourth ventral segment entire.....18.
17. Emargination of fourth ventral segment wide, the segment not produced in middle ; hair on eyes short...*grindeliæ*, subsp. *denverensis* Ckll.
Emargination of fourth ventral small and narrow, in a produced median lobe ; hair on eyes long (Beulah, New Mexico).....*rufitarsis*, subsp. *rhois* Ckll.
18. Lower apical teeth of abdomen very sharp ; very small species (California).....*angelica* Ckll.
Lower apical teeth of abdomen obtuse.....19.
19. Hair of eyes short ; face narrower (Las Vegas, New Mexico).....*grindeliæ* Ckll.
Hair of eyes very long (Olympia, Wash.)...*ribis* subsp. *kincaidi* Ckll.

A CORRECTION.

In the key to the species of *Metopia* given in my last paper on Tachinidæ (CAN. ENT., Vol. XLIII, Nos. 8 and 9), I have stated that in *Metopia lateralis* the third abdominal segment bears six or seven marginal macrochætæ, while in *Metopia leucocephala* it bears only a single pair. This distinction was based upon the study of a few specimens after I had left the National Museum, and a re-examination of a large series of specimens of both sexes shows that the character is a variable one. In both *lateralis* and *leucocephala* the number of marginal macrochætæ on the third abdominal segment varies from two to six or seven. The tendency to the development of a considerable number of strong setæ seems to be more marked in the males than in the females.

I am indebted to Mr. H. E. Smith, of the Gipsy Moth Laboratory, who called my attention to the inconstancy of the character.

W. R. THOMPSON, Naples, Italy.

THE BLATTIDÆ OF ONTARIO.

BY E. M. WALKER, TORONTO.

The Blattidæ, or cockroaches, are represented in Ontario by eleven species, only two of which, however, are natives, the others being, with two or perhaps three exceptions, merely accidental visitors from the south.

Ischnoptera pensylvanica (De Geer).—Generally distributed throughout Ontario as far north as the Temagami District, and locally common or even abundant. I have specimens from the following localities: Point Pelee; Toronto; De Grassi Point, Lake Simcoe; Stony Lake, Peterborough Co.; Lake Joseph, Muskoka District; Go Home Bay, Georgian Bay; Temagami Park.

This cockroach is very abundant on the rocky, sparsely-wooded country about Go Home Bay, where it occurs in rotten logs and under loose bark. It readily takes up its abode in the summer cottages, where it becomes as much at home in the kitchen and larder as its cosmopolitan relatives of the city, and is often regarded by the residents as a nuisance. I came across it also in considerable numbers on a rocky island in Stony Lake, Peterborough Co., while on a canoe trip. They were first seen at night running up and down a tree trunk in some numbers. Our provision bags became infested with them, and remained so during the rest of the trip.

More annoying still is their habit of eating the paste from book-bindings and nibbling the surfaces of the covers. On my first visit to the Georgian Bay Biological Station, being unacquainted with this habit, I left a water-colour drawing, which I had just made, upon a book-shelf in the laboratory. Next morning only a ghost of it was to be seen, so thoroughly had the cockroaches nibbled off the pigments from the surface of the paper.

The adults appear about the middle of June, remaining until some time in August. They are most abundant during July. The species hibernates in the nymph state. Full-grown nymphs are found in the latter part of May.

Ischnoptera borealis Rehn.—An adult male of this species, labelled

"Toronto," is in the collection of the Provincial Education Dept. I remember also seeing a similar pale *Ischnoptera* some years ago in the collection of the late Dr. Brodie, which I took for *I. uhleriana*, but as these two species had not been separated at that time, I am unable to say to which of the two it belonged.

I. uhleriana has also been reported by Caulfield from "Welland and westward" (Ann. Rep. Ent. Soc. Ont., 16, 1888, p. 71), but for the same reason, as pointed out by Rehn, this record may also belong to *borealis*.

Blattella germanica L.—The "Croton Bug" is probably common throughout the settled parts of the Province. I have specimens from Toronto, Hamilton, Goderich and De Grassi Point, Lake Simcoe.

Blatta orientalis L.—The "Black-beetle" is doubtless also common in every city and town in the Province, though I have specimens only from Toronto and Sarnia.

Periplaneta americana L.—I have never met with this cockroach in Canada, but it has been recorded from Essex County by Caulfield (loc. cit.).

Periplaneta australasiæ Fabr.—I have taken a single male adult, and Mr. C. W. Nash several nymphs of this insect from bunches of bananas at Toronto.

Nyctibora holosericea Burm.—Toronto. One nymph from a bunch of bananas.

Nyctibora sericea Burm.—Mr. Nash has an adult male which he took from a bunch of bananas at Toronto.

Leucophaea surinamensis L.—One specimen from bananas. Taken by Mr. Nash.

Pancheora virescens Thumb.—A single adult from bananas. Taken by Mr. Nash.

Pancheora acolhua Sauss. & Zehntn.?—Some years ago I sent a *Panchlora* for determination to Mr. A. N. Caudell, who labelled it somewhat doubtfully *P. acolhua* Sauss. & Zehntn. The specimen has since been destroyed by dermestids, so that the determination cannot be verified. It was taken at Toronto from a bunch of bananas.

NEW GENERA OF NORTH AMERICAN LITHOBIIDÆ.

BY RALPH V. CHAMBERLIN, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA.

In a study of the North American species of the Lithobiidæ that fall into the old genus *Bothropolys* as originally defined by Wood—that is, all those species having the coxal pores, in several series the writer finds that they compose in reality two clearly separated groups of generic value. In addition a third genus, represented by a species here described for the first time, is found, which, while evidently close to the other two in some features, differs from them in having the coxal pores arranged in but a single series. Diagnosis of these genera are herewith given together with those of other genera.

Genus *Bothropolys* Wood (emended).

Head margined continuously from the caudal end cephalad to the eyes on each side, the lateral margin not broken. Prosternum with a well chitinated spine on or near the anterior margin at each ectal angle; prosternal teeth more or less uniformly spaced with no diastema separating them into two groups on each side. Gonopods of the male consisting of a single undivided article. Basal spines of the gonopods of the female $2 + 2$. Anal legs with the tarsal claw single; penult legs with the tarsal claw armed at base with a single small or sometimes obsolete spine or accessory claw, or this sometimes quite absent. Coxal pores in several series. (Coxæ of last two pairs of legs armed each with a stout ventral spine.)

Type.—*B. multidentatus* (Newport).

In addition to the type, *B. hoples* Brolemann and *B. permundus* Chamberlin belong in this genus.

Genus *Ethopolys* gen. nov.

Lateral margination of head ending abruptly about one-third the distance forward from the caudal edge, each lateral margin being distinctly broken—that is, rectangularly bent in at this level. A wider interval of diastema separating an ectal group of from 1 to 4 prosternal teeth on each side from an inner larger group, a slender, often more or less bristle-tipped spine, occurring in the diastema, but none at the ectal angle. Gonopods of the male distinctly biarticulate. Basal spines of the gonopods of the female $3 + 3$. Tarsal claw of anal legs with a very small spine or accessory claw at base; the claw of penult legs with two accessory claws. Coxal pores in several series. (Coxæ of last two pairs of legs each armed with a stout ventral spine).

Type.—*E. xanti* (Wood).

June, 1912

In addition to the type *sierravagus* Chamberlin, *E. pusio* Stuxberg, and *E. bipunctatus* (Wood) belong to this genus, as does probably also the doubtful species *E. monticola* of Stuxberg, which I formerly have regarded as probably the same as *sierravagus* but which agrees rather better with adult *pusio*, a species which Stuxberg based on a very young and immature specimen, though differing according to the published description from either.

Genus *Zinapolys* gen. nov.

Each lateral margin of the head distinctly broken a little in front of caudal third of its length as in the preceding genus. Prosternal spine immediately caudal of the ectal prosternal tooth on each side; prosternal teeth large and uniformly spaced, no diastema separating them on each side into two groups. Gonopods of male distinctly biarticulate. Basal spines of gonopods of female 6 + 6. Claws of legs, especially of the more caudal pairs, long and rather slender, all with two accessory claws. Coxal pores in a single series on each coxa of the last four pairs of legs. (Coxæ of the last two pairs of legs each armed with a stout ventral spine).

Type.—*Z. zipius* sp. nov.

The type is the only species of the genus thus far known.

Zinapolys zipius sp. nov.

Antennæ short, composed of 20 articles; the articles beyond the large second one of moderate length, becoming shorter proximad of the ultimate; hairs clothing the articles usually long, mostly oblique to surface; not very dense. Eyes composed of about twenty ocelli arranged in four series, eg. 1 + 5, 5, 4 (3). The single ocellus not very large. Organ of Tomosvary large, exceeding an ocellus, well removed from the eye-patch. Prosternal teeth 6 + 6-7 + 7, the most ectal on each side largest; the others decreasing from this one to the mesal incision. Spine moderately stout at base but apically long and bristle-like. Angles of none of the dorsal plates produced. Gonopods of male distinctly biarticulate, the distal article much narrower than the proximal; subconic, pale. Claw of gonopods of female entire, curved, deeply hollowed out on ventral side. Basal spines 6 + 6, mostly thickest at middle, being acuminate distad and somewhat narrower at base. Coxal pores circular to transversely sub-elliptic, moderately large and distinct; 4, 4 (5), 5, 5. Spining of legs: first to seventh, $\frac{0,0,3,2,2}{0,0,2,3,2}$; eighth to eleventh, $\frac{0,0,3,2,2}{0,0,3,3,2}$; twelfth and thirteenth, $\frac{1,0,3,2,2}{0,1,3,3,2}$; penult, $\frac{1,0,3,1,1}{1,1,3,3,2}$ and 1, $\frac{1,0,3,1,0}{1,1,3,3,1(2)}$. All legs terminating in three claws. Last two pairs of coxæ armed laterally as well as ventrally and dorsally.

Original coloration somewhat uncertain because of long preservation of specimens in too weak alcohol, but apparently ferrugino-testaceous with the legs and venter more yellowish, and the caudal ventral plates and legs and the prosternum and head darker; antennæ darker than legs but somewhat paler than head. Length 17-20 mm.

Locality.—Kooteno Co., Idaho.

Genus *Paitobius* gen. nov.

Head as in *Lithobius*, as also are the mouth-parts, nearly. Coxosternum of second maxillæ with narrow median membranous strip which is thin and bent dorsally. Prosternum bearing uniformly 2 + 2 teeth of which the inner one on each side is always borne conspicuously farther forward than the outer, the line tangent to apices of teeth curving cephalad from sides to middle, i.e., being procurved. Spine at ectal angle bristle-like apically. Anterior margin narrow, the lateral slope beginning almost directly from ectal tooth. Antennæ always short, consisting of from 27 to 35 articles. Coxal pores uniseriate, circular. (Last two pairs of coxæ laterally armed). Penult legs always armed with two claws; and legs also armed with two claws (excepting in *naiwatus*). Dorsal spines of anal legs always 1,0,3,1,0; of penult, 1,0,3,1,0 to 1,0,3,2,1. Anal and penult legs always short and distinctly furrowed longitudinally along dorsal surface of third to fifth articles; furrow more distinct on third article and especially in the male in which this article is wider or more crassate than in the female. Gonopods of male small, conical, directed caudo-ectad and nearly always wholly concealed by the sternite. Gonopods of female with the claw always distinctly partite, three lobes being typically present or rarely one of these almost obliterated. Basal spines rather slender and acuminate from base, distad. Body of adults always showing a deeper violaceous or purplish or reddish-purple pigment, modifying the coloration, more or less, of entire body; and in preserved specimens, at least, distinctly colouring especially the muscles. Anal legs always dark, proximally with the tibiæ and tarsi conspicuously paler, usually yellow. The head and dorsum smooth and shining, never rugose. (In all known species the 9th, 11th and 13th, of 6th, 7th, 9th, 11th and 13th, or of 7th, 9th, 11th and 13th dorsal plates with posterior angles produced.)

Type.—*P. caroline* Chamberlin.

Distribution.—The South-eastern States.

In addition to the type, the genus includes the following species: *naiwatus* Chamberlin, *tabius* Chamberlin, *juventus* Bollman, and *simitus* Chamberlin.

The genus, which is compact, can readily be detected by the character of the prosternal teeth.

Genus *Taiyubius* gen. nov.

This genus is very close to the preceding, but the species composing it may always be at once distinguished by the characters of the prosternum, the teeth of which are the same in number but differ in not having the inner teeth borne far forward, and in having the axis of each of the latter directed somewhat mesad of directly cephalad, with the line tangent to apices of teeth curving caudad from the sides mesad, i.e., this line clearly recurved. Antennæ short, or very short, consisting of from 26 to 39 articles. Posterior coxæ either entirely unarmed laterally or with each one of last pair or of last two pairs with a weakly developed spine which is often difficult to detect. Anal legs always with two claws; penult with two or three. Dorsal spines of anal legs, 1,0,3,1,0; of penult, 1,0,3,1,1. Anal and penult legs very nearly as in *Paitobius*. Gonopods nearly as in *Paitobius*, but basal spines characteristically much broader and wider near middle of length. Pigmentation much as in preceding genus. In known species posterior angles of 9th, 11th, and 13th dorsal plates produced.

Type.—*T. angelus* Chamberlin.

Distribution.—Western United States.

Other species belonging to this genus in addition to the type are *satanus* Chamberlin, *harriela* Chamberlin, and *purpureus* Chamberlin.

Genus *Sonibius* gen. nov.

Related to the two preceding genera which it replaces in the north central section of the country. The prosternal teeth small and subequal, 2 + 2 or 3 + 3 in number, with the line of their spaces recurved.

Readily distinguished from the preceding two genera in having the short antennæ composed normally of but twenty articles which are relatively long, whereas in *Paitobius* and *Taiyubius* they are mostly very short and crowded. Last two or three pairs of coxæ laterally armed, last four or five pairs dorsally armed. Anal legs armed with two or three claws as are also the penult, the number being mostly three. Dorsal spines of anal legs 1,0,3,1,0; of penult and 13th always 1,0,3,1,1. Gonopods of female with claw partite. Basal spines characteristically short and broad. Adults not showing the peculiar reddish-purple pigment in deeper tissues manifest in *Paitobius* and *Taiyubius*. Dorsum always smooth and shining. In known species posterior angles of 9th, 11th, and 13th dorsal plates produced.

Type.—*S. bius* Chamberlin.

Distribution.—North Central United States.

Besides the type, other species known to belong to this group are *politus* McNeil, *numius* Chamberlin, and *yanikans*, sp. nov.

Arenotini

Most of the species of the Lithobiidæ known from Central America and from Mexico compose a group which may be designated as the Arenobini. Among other features all have the gonopods of the male, although large and prominent, composed of but a single article and the claw of the gonopods of the female wholly undivided, with basal spines 2 + 2, large and stout, and the basal article with inner sides strongly chitinated and conspicuously excavated toward base. The dorsal spines of the anal legs from 1,0,3,2,1(0) to 1,0,3,2,2; of the penult always 1,0,3,2,2 in the female, and either the same or 1,0,3,2,1 in the male. Excepting the new genus *Sotimpilus*, proposed for *Lithobius macroceros* and *L. decodontos* of Pocock, the prosternal teeth are 2 + 2 in number with the ectal spine in many species stout and tooth-like. In *Sotimpilus*, which will not be further discussed here, the prosternal teeth number 5 + 5 or 6 + 6 and the ectal spines are bristle-like.

Genus *Arenobius* gen. nov.

Body conspicuously attenuated, cephalad with first dorsal plate narrower than the third. Dorsum smooth and shining, especially the first plate and the head. Prosternal teeth 2 + 2 with in most the spines stout and dentiform or more rarely these slender and bristle-like (only in Subgenus *Sititius*). Antennæ short to medium, occasionally equalling half the length of the body; composed mostly of from 25 to 60 articles. Coxal pores uniseriate, circular or a little transversely elongate. With one exception the anal legs are armed with two or three claws. Dorsal spines of the anal legs 1,0,3,2,1 normally, occasionally varying in individual cases to 1,0,3,2,0 or 1,0,3,1,1; dorsal spines of penult legs in females always 1,0,3,2,2; in males nearly always 1,0,3,2,1, rarely the same as in female (frequently so in immature stages). With few exceptions both the anal and the penult legs are conspicuously modified in the male, the tibiæ of both bearing special lobes, furrows or bunches of hair; more rarely with the penult legs normal and with the first tarsal joint specially modified. Gonopods of female with claw large, strongly curved and entire; basal spines 2 + 2, stout; first joint with distal and inner edges strongly chitinated, excavated on mesal side toward base, leaving between the two a broadly

triangular space with apex distad. Gonopods of male rather large and conspicuously exposed, but undivided.

Type.—*A. manegitus* Chamberlin.

Distribution.—From Colorado to the South-eastern States, and southward through Mexico to Central America.

In the United States, besides the type species, occur three other known species which differ from the type in having the ectal spines slender and apically bristle-like as well as in the character of the lobe on the penult legs of male. They may be placed in a separate sub-genus *Sibibius*. The species of this sub-genus are *coloradanus* sp. nov., *mississippiensis* sp. nov., and probably *ædipes* Bollman. Composing a new sub-genus *Kunobius* are the two species *pontifex* and *humberti* of Pocock, which differ in having the penult legs of male not at all modified while the first tarsal joint of the anal legs is very strongly enlarged, the tibiæ being specially modified as well. Both these species are from Province Guerrero, Mexico. The species *stolli* Pocock from Guatemala, differs from all other species of the genus in having all the dorsal plates with posterior margins straight, none of the angles being produced, and, according to the original description, in having the claw of the anal legs single. It may be placed in a subgenus *Sorubius*. Other Mexican and Central American species apparently belonging to *Arenobius* are the following: *godmani*, *salvini*, and *vulcani* of Pocock and *sontus* sp. nov., a rather aberrant species described below.

(To be continued.)

MEETINGS OF THE MONTREAL BRANCH.

Meeting Jan. 9th, 1912.—At the residence of Mr. H. H. Lyman, 11 members present. Mr. G. A. Southee in the chair. Mr. Lyman read a paper entitled "Further Notes on Types in the British Museum."

Mr. H. F. Wolley Dod, of Calgary, Alta., gave an interesting account of his visit to some of the U. S. collections of Lepidoptera. He referred particularly to those of Dr. J. B. Smith at New Brunswick, N. J.; the U. S. National Museum at Washington; the Strecker collection at Chicago, and that of Dr. Wm. Barnes at Decatur, Ill.

Discussion followed on the various methods of collecting Noctuids.

Specimens of the genus *Xylina* were exhibited, representing about 25 North American species.

Meeting Feb. 10th.—At the residence of Mr. G. Chagnon; 6 members present. Mr. Southee in the chair.

A letter was read regarding supposed injury to greenhouse plants caused by a beetle, specimens of which were submitted. These were seen to be *Nacerdes melanura*, a European insect introduced through commerce. It is now very abundant in warehouses downtown, particularly near the wharves, and is often seen in numbers on sidewalks throughout the summer.

Mr. Winn read a short paper entitled "A Miniature Insectary," describing a space in his cellar boxed in around a south window, the inner of the double windows having been moved about three feet back, the outer window being left on during the winter and replaced by a wire screen in summer. The space only amounted to perhaps 40 cubic feet, but was sufficient to accommodate on shelves a number of breeding cages, jelly jars, boxes and tubes, and the conditions seemed to suit the insects, as there were practically no failures to get imagoes or parasites.

Mr. Moore read a paper on "Sexual Differences in Hemiptera," illustrated by specimens. Size and colour are the usual characters. Females of most species were much more seldom found in collecting than males, whether this was due to secretive habits of the females he did not know.

The Secretary followed with a paper on "The Determination of Sex in Lepidoptera. Several boxes of specimens were shown to illustrate the superficial points of distinction. The structure of the antennæ, the frenulum and some slides of genitalia were shown under the microscope.

Copies of Dr. Barnes' and Dr. McDunnough's "Contributions to N. A. Lepidoptera," Parts I-III, were shown.

Meeting March 9th.—At the residence of Mr. Lachlan Gibb; 10 members present. Mr. Chagnon, Vice-President, in the chair.

The question of finding a new place for the cabinet and book-cases was taken up, owing to Mr. Gibb's departure for England, and Mr. Lyman offered to look after it temporarily.

A paper on "Rye's Newest Moth," by Henry Bird, Rye, N. Y., was read by the Secretary. The paper dealt with the discovery of *Gortyna erepta* boring in the roots of a coarse grass on the shore of the Atlantic. The species had previously been taken only in Kansas.

The chairman then announced that he had a pleasing duty to perform, and handed to Mr. Lyman an illuminated address, signed by all the members of the Branch, expressing their good wishes on the occasion of his marriage. Mr. Lyman replied, thanking the members for their gift.

Copies of two parts of the "Genera Insectorum," dealing with the family Geometridæ, were shown by the Secretary, as well as some drawings of structure of the Brephinë.—A. F. WINN, Secretary.

INSECTS BRED FROM COW MANURE.†

BY F. C. PRATT,

Late Assistant Entomologist, Bureau of Entomology.

NOTE.—This paper has been compiled from numerous notes made by Mr. F. C. Pratt some time before his death. The investigation was prosecuted with skill and enthusiasm by Mr. Pratt, and the paper gives but a slight idea of the large amount of work on the subject which was done by this assiduous entomologist.—W. D. HUNTER.

INTRODUCTORY.

In 1907, at the suggestion of Mr. D. L. Van Dine, an attempt was made by the Bureau of Entomology to breed parasites of the horn-fly (*Hæmatobia serrata* Rob.-Dev.) to ship to Hawaii for experiments in the control of the pests. Although a number of predators were bred, no absolute records of parasitism were obtained. However, the work resulted in the rearing of a considerable number of species which have not been known to develop in cow manure. The following list may be considered supplementary to that of Dr. L. O. Howard (CAN. ENT., Feb., 1901, pp. 42-44), which dealt exclusively with Diptera. Dr. Howard's list included 25 species of Diptera, the present list contains 31 species of that order, 17 of Coleoptera and one of Lepidoptera. Of the species of Diptera included in Dr. Howard's list, 14 occur in this one and 20 are new.

Special notes were made on the occurrence of the various species in the stables and milking-houses on account of the possibility of the contamination of the milk by disease organisms or in other ways.

The records from Victoria, Texas, were obtained by Mr. J. D. Mitchell. The species previously bred from cow manure are preceded by an asterisk. The Diptera were determined by the late D. W. Coquillett, and the Coleoptera by Mr. E. A. Schwarz.

List of species bred from cow manure.

DIPTERA.

Family PSYCHODIDÆ.

**Psychoda minuta* Banks.—Victoria, June 9. Six specimens.

Family CHIRONOMIDÆ.

**Ceratopogon specularis* Coq.—Dallas, July 26, 29, 30, Aug. 31, Oct. 21, Nov. 4. Victoria, May 27, Dec. 1. Seventy specimens.

This species has also been bred from cow manure by Long. See Biol. Bull., 1902, p. 7.

Family MYCETOPHILIDÆ.

**Sciara*, sp.—Victoria, June 9. Nine specimens.

†Published by permission of the Chief of the Bureau of Entomology.

Family CECIDOMYIDÆ.

Lestremia leucophæa Meig.—Dallas, July. Two specimens.

Bred from droppings one day old in pasture.

**Diplosis* sp.—Victoria, June 9. One specimen.

Cecidomyia sp.—Victoria, June 9. Dallas, May to December. Seventeen specimens.

The salmon-coloured larvæ are very conspicuous. The species apparently is perfectly at home in the manure.

Family BIBIONIDÆ.

Scatopse atrata Say.—Dallas, July 26, Sept. 18. Nineteen specimens.

This species was bred from fresh manure. The flies follow the cattle into the stables.

Family EMPIDIDÆ.

Tachydromia pusilla Loew.—Dallas, June 22. One specimen.

Family SARCOPHAGIDÆ.

**Sarcophaga* (*Helicobia*) *quadrisetosa* Coq.—Dallas, July 26, 29, 30, Sept. 10, 16, 18, 23, Oct. 8. Victoria, June 15, July 4, 23, Nov. 2, 24. One hundred and forty-two specimens.

This species is one of the most common in cow manure. From one dropping 78 specimens were bred. The developmental period varied from 7 to 14 days. The flies frequently invade the stables, and are often seen on the manure immediately after it is voided.

Sarcophaga incerta Wills.—Dallas, Aug. 1, 16, Sept. 3, 10, 12, 22, Oct. 18, 21, 23. Fifty-nine specimens.

This species is exceedingly common in the pastures, but is seldom seen in the stables. It develops in from 14 to 18 days in the summer.

Sarcophaga assidua Wills.—Dallas, July 26, Aug. 3, Sept. 9, 12. Thirty-eight specimens.

This species has been bred from fresh manure in the milking-houses. The developmental period in August ranged from 17 to 20 days.

Sarcophaga heliciis Towns.—Victoria, Aug. 7. One specimen.

On account of the published notes on the habits of this species it is likely that the occurrence in cow manure was accidental.

Sarcophaga varicauda Coq.—Dallas, July 30. Twenty-four specimens. This species is found in and about the milking-houses more commonly than in the pastures. Development occupied from 10 to 14 days.

Family MUSCIDÆ.

Pseudopyrellia cornicina Fabr.—Dallas, July 29, Aug. 19, Sept. 10, 17, 22, Oct. 21, 23, 24, 26. One hundred and thirty-two specimens.

This species is frequently found in the stables. It places its eggs in clusters on fresh manure. In one case 285 puparia were found in one mass of manure. Development occupies from 9 to 20 days, depending upon the temperature.

Pyrellia cyanicolor Zett.—Victoria, Oct. 4. Twenty specimens.

**Morellia micans* Macq.—Dallas, 17, 22. Thirteen specimens.

**Musca domestica* L.—Dallas, Tex., June 17, 19, July 20, 31, Aug. 19. Fifty specimens.

This is one of the most common species in the stables. Fresh manure attracts it in great numbers.

Stomoxys calcitrans L.—Dallas, Aug. 3. One specimen.

This species is very abundant in and about the stables, but, judging by our records, does not breed commonly in cow manure.

**Hematobia serrata* Desv.—Dallas, June 22, July 26, Sept. 14, 18, 19, 21, 22, 28, Oct. 8, 14. Victoria, July 18, Oct. 4, Dec. 10. Fifty-three specimens.

This species is to be found in the milking-houses. It varies greatly in numbers with the weather. Dry weather prevents development, and a series of showers invariably brought about a sudden and conspicuous increase in numbers.

**Myiospila meditabunda* Fabr.—Dallas, July. Twenty-two specimens.

This species was not observed in the stables.

Family ANTHOMYIDÆ.

Limnophora discreta Stein.—Dallas, July 30, Aug. 31, Sept. 5, 12, 23. Victoria, May 3, 9, 25, Aug. 9, Sept. 10, Nov. 1. Ninety-eight specimens.

This is one of the most abundant species. It was not taken in the milking-houses, but was frequently bred from manure deposited in their immediate vicinity.

Limnophora debilis Will.—Dallas, July 26, Aug. 1, 24, Sept. 7, 16, 23, Oct. 7, 9, Nov. 4. Victoria, Aug. 9, Oct. 14, 20, Sept. 10, Nov. 4. Two hundred and thirty-four specimens.

This species and the preceding are apparently the most common flies breeding in cow manure in Texas, except the undetermined species of *Limnosina*.

Anthomyia albicincta Fall.—Victoria, June 27. Three specimens.

Apparently this species breeds in a great variety of substances.

Pegomyia fusciceps Zett.—Victoria, June 3. Fourteen specimens.

This record seems to be substantiated by the breeding from human excrement, as noted by Dr. L. O. Howard.

Family BORBORIDÆ.

Limnosina spp.—Dallas, Aug. 30. Three hundred and sixty specimens. *L. albipennis* Rond. has been recorded.

Apparently three species were bred from fresh as well as partially dried deposits.

Family SEPSIDÆ

Sepsis pleuralis Coq.—Victoria, Oct. 10. One specimen.

**Sepsis violacea* Meigen.—Dallas, July 29, Sept. 12, 19, 20, 21, Oct. 26, Nov. 6. Victoria, Texas, July 9, Aug. 4, Oct. 10. Seventy-seven specimens.

This species was taken commonly in the stables. It breeds in fresh droppings.

Sepsis insularis Will.—Dallas, Aug. 22, Oct. 8, 18. Victoria, May 14, Sept. 10, Dec. 1. Fifty specimens.

This species was taken in the stables repeatedly.

Family OSCINIDÆ,

Hippelates microcentrus Coq.—Dallas, Sept. 3. One specimen.

An allied species, *flavipes*, was bred from human excrement. See Dr. Howard's list.

Elachiptera costata Loew.—Dallas, Aug. 3. One specimen.

Family AGROMYZIDÆ.

Desmometopa m-nigrum Zett.—Dallas, Aug. 22. One specimen.

The single specimen bred was from fresh manure in a stable.

COLEOPTERA.

Family HYDROPHILIDÆ.

Cercyon nigriceps Marsh.—Dallas, Sept. 10, 14, Oct. 9, 17, 23, 26.

Two other species were bred from human excrement. See Dr. Howard's list.

Family STAPHYLINIDÆ.

Aleochara bimaculata Grav.—Dallas, Oct. 19.

This species is probably predaceous. It was taken in manure three days old.

Philonthus flavolimbatus Er.—Dallas, Oct. 19.

This species and the following were found in the breeding-cages, but there is no absolute proof that they were actually breeding in the manure.

Philonthus varians Payk.—Dallas, Aug. 6.

Philonthus longicornis Steph.—Dallas, Aug. 27.

Lithocharis ochracea Grav.—Dallas, Aug. 19, Sept. 10.

Cilea silphoides Er.—Dallas, Sept. 10.

Platystethus americanus Er.—Dallas, Sept. 23.

Platystethus spiculatus Er.—Dallas, July 30, Aug 3, 19.

Oxytelus sculptus Grav.—Dallas, Aug. 3, Oct. 28.

Family HISTERIDÆ.

Hister abbreviatus Fab.—Victoria, Oct. 14.

Hister cœnosus Er.—Victoria, April 15. Dallas, June, July.

This species is predaceous. It was found devouring the larvæ and puparia of *Pseudopyrellia cornicina*, and undoubtedly attacks other species, including the horn-fly.

Family SCARABÆIDÆ.

Canthon lævis Dury.—Victoria, April 15.

Aphodius fimetarius Linn.—Dallas, Oct. 19.

Aphodius lividus Oliv.—Dallas, Sept. 10, Oct. 18.

Aphodius vestiarius Horn.—Victoria, April 15, Oct. 20, Aug. 4.

Aphodius sp.—Victoria, April 15.

The various species of *Aphodius* are by far the most common beetles found in cow manure.

LEPIDOPTERA.

Family TINEIDÆ.

Setomorpha rutella Zeller (det. Aug. Busck)—Victoria, Nov. 23.

The occurrence of this species in cow manure may be accidental.

NEW SPECIES OF THE COLEOPTEROUS GENUS
COLLOPS ER.

BY CHARLES SCHAEFFER,

Museum of the Brooklyn Institute, Brooklyn, N. Y.

Special help employed last year at our Museum to catalogue the collections made it necessary to rearrange certain boxes as well as to identify unnamed species. In the genus *Collops* several species collected on our museum trips, and from other sources, proved to be new, were given names and entered in our catalogue. It was my intention to revise the entire genus later on and the descriptions of the different forms drawn were kept back for this reason. However, as I have for some reason, to delay at present a revision of this genus, the descriptions of the new species are published in advance, in order that the names entered in the catalogue may stand.

The measurements of the species herein described are taken from specimens with the head deflexed.

June, 1912

Collops nigrinus, new species.

Head black, densely punctate; clypeus reddish. Antennæ with first joint relatively strongly angulate at middle, red with a black spot; second joint reddish, on underside blackish; following joints black, rather feebly serrate. Prothorax red; surface densely punctate with the usual short, pale and erect black hairs. Elytra black, very densely punctate. Basal half of each ventral segment black, apex red. Legs black, apex of anterior coxæ reddish. Length 3.5 mm.

Arizona.

A single male found among the unmounted material of the Dietz collection.

From all species with unicolorous elytra, this species differs by the rather strongly angulated first antennal joint of the male, the densely punctate prothorax, and the black elytra.

Collops parvus, new species.

Head bluish-black; clypeus reddish. Antennæ black, first joint red, excavate on inner side. Prothorax red; surface shining, scarcely punctate on the disk. Elytra elongate-oval, blue, feebly shining; surface moderately densely punctate. Trochanters and femora black, tibiæ and tarsi red. Ventral segments red, black at sides. Length 3 mm.

A single male in the O. Dietz collection from Arizona labelled *punctatus*.

Collops eximius, var. *floridanus*, new var.

Like *eximius* Er., except thorax red, without large, black spot. Length 5 mm.

Florida, collected by R. F. Pearsall and received from A. Nicolay.

A large series of *eximius* Er. which I have seen, shows very little variation in the form of the black spot. The series in Mr. Nicolay's collection from Florida is also constant, except that in some specimens two faint, narrow, dark spots are visible on the thorax.

Collops aulicus Er.—Entomographien, p. 55.

I have taken a female specimen in the Huachuca Mts., Ariz., which, according to the figure in the Biol. Cent. Am. Col., Vol. III, pt. 2, pl. VI, fig. 21 and 22, seems to be that species. However, I have not seen the original description, but, as the species is also reported from Guanajuato, it is more than probable that my surmise is correct. A specimen in the Dietz collection from Arizona, which agrees well with the description of

marginicollis, differs only from the above mentioned specimen by having the thorax black, with side margins near base, more or less narrowly pale. If the two should prove to be the same, *aulicus* Er. as the older name, has to be accepted for this species.

Collops argutus Fall—Occ. Pap. Cal. Acad., VIII, p. 242.

A few specimens from the Huachuca Mts., Arizona, agree closely with the description of this species, except that the abdomen is red, with last segment black. The abdomen in the description is said to be black in some specimens, and rufous at middle near base in others, which indicates that the colour of abdomen at least is variable.

Collops femoratus, new species.

In coloration, nearest to *pulchellus* Horn, but not quite as elongate; elytra more finely and closely punctate; basal antennal joint of male not excavate on the inner side; front and middle femora and hind femora at base red, tibiae and tarsi black. Length 4 mm.

Huachuca Mts., Arizona.

The ventral segments are red in a few males; in one male and in the females they are spotted with black at sides. A female from Brownsville, Texas, with clear, red abdomen, does not seem to differ otherwise from the Arizona specimens.

Collops scutellatus, new species.

Red; metasternum and palpi black; head with central bluish spot and elytra with basal and elongate-oval, blue, apical spots; the two spots on each elytra narrowly divided. Thorax narrower than in *pulchellus*, *argutus* or *femoratus*; scutellum clear-red. Basal antennal joint rather slender, feebly enlarged towards apex, and not excavated on inner side; the outer joints feebly dilated. Length 3.25 mm.

One male, New Braunfels (O. Dietz.)

The coloration, the scarcely apically dilated basal joint of antennæ, the red scutellum and the more shining elytra will separate this from all previously described maculate species.

Collops tibialis, new species.

Head blue, clypeus and a large, oval, median spot from the clypeus to almost the middle of the head, reddish. First two antennal joints of male red, the outer blackish and feebly serrate. Prothorax shining, red, feebly punctate at middle, distinctly so at sides. Elytra with two large blue basal spots connected at suture, and oval sub-apical spot on each

side, involving largely the lateral margin. Surface punctured similarly to *quadrimaculatus*. Femora black, tibiæ red, abdomen red. Length 3 mm.

Nogales, Arizona (F. W. Nunnemacher.)

A small species with thorax less transverse than the other species.

Collops similis, new species.

Head bluish-black, inter-antennal space and clypeus red. Antennal joints red; first joint stout, the other serrate. Thorax red at middle with two, rather indistinct, darker lines. Elytra red, with basal and oval sub-apical spot blue; surface more coarsely punctate than in *quadrimaculatus* Fab. Front and middle femora red; hind femora, tibiæ and tarsi black. Abdomen red. Length 3.50 mm.

S. W. Utah, collected by J. Chr. Weidt, of whom I bought a few specimens some years ago. This type is in the Museum collection. This species has more coarsely punctate elytra than any other of the known maculate species.

Collops punctulatus, var. *texanus*.

Like *punctulatus* Lec., except that the thorax is bright red. Length 2 mm.

Brownsville, Texas.

A few specimens have the blue elytral vittæ narrowly divided, forming two large spots on each elytron; in one specimen the spots are confluent as in typical *punctulatus*.

Collops punctulatus, var. *utahensis*, new var.

Differs from *punctulatus* in having the elytral vittæ broadly divided. The basal spot is small and more or less transverse. The apical spot oval. Length 2-2.25 mm.

Buckskin, Utah. (Doll & Engelhardt.)

Apparently a constant, local form of *punctulatus*.

Collops sublimbatus, new species.

Closely allied to *C. georgianus* Fall, from which it differs in having the head polished, the disk of prothorax shining, and scarcely punctate. Length 3.5-4 mm.

Clayton, Georgia.

Through the kindness of my friend, Mr. William T. Davis, I have seen a number of specimens which agree very closely with Fall's description of *georgianus*, except as above stated. From *limbellus*, it differs in having the outer antennal joints not serrate, and the second joint is much wider than long.

ON THE LARVAL STAGES OF CERTAIN ARCTIAN SPECIES.

BY WM. BARNES, M.D., AND J. H. MCDUNNOUGH, PH.D., DECATUR, ILL.

(Continued from page 136.)

Apantesis incorrupta H. Edw.

We received a ♀ of this species about the middle of June from the neighbourhood of Redington, Ariz., which had deposited numerous ova en route. The young larvæ hatched within 1-3 days after receipt of eggs. In all probability therefore, the duration of ovum stage is about 5 days. Unfortunately, owing to our absence from home, the complete larval history could not be worked out. The early stages may however prove of value, especially when compared with those of *nevadensis*, of which Dyar lists *incorrupta* as a variety. We, ourselves, see no reason why it should not enjoy specific rank.

Ovum.—Very similar to that of other *Apantesis* species; rather conical, with flat base. Yellowish, turning black before emergence, laid promiscuously.

Stage I.—Head and prothoracic shield blackish, latter with 4 anterior and 4 posterior setæ. Body pale reddish, with green of the food largely showing through the skin after eating. Tubercles blackish, with a similar arrangement to that of other *Apantesis* species. Tubercle I small, with minute, white seta. The seta of tubercle II and the upper one of III black on abdominal segments; all other setæ long, white, increasing in length on rear segments. On meso- and metathorax, tubercles I and II possess one white and one black seta. Length 3 mm.

Stage II.—Head, thoracic plate, and tubercles black; body purplish brown, shading into lighter ventrally, and tinged with orange at the base of the lateral tubercles III-V. A pale, dorsal line and a broken subdorsal one on a level with tubercle III. Tubercle I minute, with single short black seta; on thoracic and two posterior abdominal segments, tubercle II possesses a single long white seta, surrounded by 6 or 7 shorter black ones; on the remaining abdominal segments the white seta is lacking, and the black setæ are 5-6 in number. Tubercle III on thoracic segments with two long black setæ and several small basal ones; on abdominal segments with very long white central seta, a ring of about 4 shorter black ones, and a small cluster of minute basal white hairs. Tubercle IV similar in arrangement to III; ventro-lateral tubercle with short white setæ. Length 5 mm.

June, 19.2

Stage III.—Very similar to preceding with an increase of secondary black setæ, single long white seta present as before; whitish dorsal line slightly enlarged in centre of each segment. Length 7 mm.

Stage IV.—Head black, body purplish brown mottled strongly with whitish; pale dorsal line very distinct; subdorsal line almost lost in the white marbling. Tubercles black, lateral ones distinctly orange at bases. Long white setæ of III and IV very prominent, especially on rear segments. Tubercle V of anterior segments also bears a white seta which is lacking in the posterior half; other setæ mostly black. Lateral abdominal tubercles with several pale setæ inclining to orange; spiracle black. Prothoracic plate split up into 4 chitinous mounds of which the two anterior are the larger, bearing numerous setæ projecting over the head; the posterior carry 4 6 setæ. Legs black. Length 13 mm.

Apantesis phalerata Harris.

The larval history of this moth has been already described by Gibson (CAN. ENT., XXXII, 369; id. XXXIV, 50). We venture to add, however, some more precise details on the earliest stages, as it is probably in these that we must look for points of distinction from closely allied species.

A ♀ of the form *radians* Wlk., i. e., with W mark absent and broad black border to red hind-wings, deposited ova freely in June; these were not dropped promiscuously as in the previous form but placed neatly in rows in irregular groups on the underside of any available object. The egg itself offers no points of distinction, being similar to those species already described. We were unfortunately not able to breed the species through.

Stage I.—Head, lobes blackish; clypeus and mouth-parts as well as suture between lobes, pale brown; body pale greenish red; tubercles dark; on abdominal segments I minute, with white seta; II and III as usual. Setæ black on all segments except on 9th abdominal, where 9th dorsal tubercle bears two long white and two black setæ; remaining tubercles bear white hairs. Prothoracic plate the colour of body, except for a dark mound on each side of the central line anteriorly; these mounds bear each 2 black setæ. There is further a posterior row of four setæ, the outer (lateral) one being white. Length 2.7 mm.

Stage II.—Head as before. Body greenish brown with pale dorsal stripes and orange tinges laterally at the base of the tubercles. Characteristic of this stage is the great increase of setæ on tubercle II which bears 10-12 short black hairs. On abdominal segments III has 2 or 3

black central setæ surrounded by a ring of 4-5 small white ones ; on thoracic segments III bears merely 1-2 black setæ. The lateral tubercles bear one long central black seta, the remaining ones being smaller and white. The thoracic plate shows four slightly raised darker areas, two anterior and two posterior, each bearing the black setæ. All legs the colour of the body. Length 4.8 mm.

Euchatias spraguei Grt.

Ova sent by Mr. Kwiat of Chicago in June hatched during transmission, the young larvæ eating the egg shells. From a rather crushed unfertile egg following note was made.

Ovum.—Hemispherical, with flat base ; pitted with numerous slight punctures ; pale orange-yellow. Diameter .4 mm.

Stage I.—Head black, with sparse black setæ. Body pale red-brown with large black almond- or kidney-shaped tubercles ; arrangement of setæ typically Arctian ; tubercle I about half as large as II, with short black seta ; seta of II black, longest on 1st and last two abdominal segments ; III with black setæ ; lateral setæ short and white ; thoracic plate semilunate with 4 setæ on anterior margin. When at rest the first two abdominal segments appear slightly humped. Length 3 mm.

Stage II.—Head pale yellowish ; body red-brown, becoming later yellowish ; tubercles black, II and III being the largest ; tubercle I with two long black setæ and a couple of short white ones inclined towards the head ; II with about 8 black setæ ; III with 6 ; IV small, situated immediately posterior to the spiracle and bearing two setæ ; V with 5-6 setæ of which the central one is black, the remainder white ; VII larger with 2 central black and 8-10 white basal setæ ; spiracle pale with black rim. Length 6 mm.

Stage III.—Head and body pale orange yellow ; tubercles blackish arising out of a pale base and with numerous long plumed gray hairs ; traces of a pale subdorsal line and lighter shading laterally around tubercle V. Length 13 mm.

Stage IV.—Head, body and legs pale orange with traces of a pale yellow subdorsal and a similarly coloured subspiracular line : tubercles black, giving rise to numerous long, silky, plumed, dark gray hairs, which form a thick covering over the body. Length 20 mm.

Stage V.—Head pale reddish ; body dorsally pale green, shading into pale orange laterally ; traces of a dark dorsal line and the pale subspiracular line of the previous stage ; tubercles pale ; base of hair black ; body thickly

covered with long silky plumed pinkish gray hairs; the medio-dorsal hairs blackish, forming a dark dorsal line; prolegs reddish; spiracles creamy, rimmed with black. Length 28-30 mm.

Pupation in a coarse cocoon of mixed hairs and earth on or just beneath the surface of the ground.

Pupa of the usual type, with immoveable segments, dark brown. One pupa out of sixteen emerged during July; the remainder are hibernating.

Food plant.—Spurge (*Euphorbia*).

APHID NOTES FROM OREGON.

BY H. F. WILSON, CORVALLIS, OR.

(Continued from page 159.)

Stem-mother.—Collected on terminal shoots of *Pseudotsuga douglassii* about Corvallis, Oregon, March 15, 1911.

General colour light brown, with two rows of black spots extending midway along the dorsum to the middle of the abdomen. These spots sometimes join so as to give the appearance of two dark lines extending along the body. Body semi-shining and with faint traces of a light flaky powder on dorsum. Legs and antennæ dusky brown. After having been mounted on slides for some time this species turns red and a deep red colour is assumed by the balsam surrounding them. The abdomen is quite large in comparison with the head and is almost globular. Antennæ VI segmented, and about one-fifth the length of the body. The nectaries are but small round tubes slightly elevated; they are about as wide as long and are situated on the side of the abdomen about two-thirds of the way from the base of the thorax to the base of the cauda. Cauda broad and slightly angled, very short.

Measurements: Length of body, 3.8 mm.; width, 2.99 mm. Length of antennal segments, I, .09; II, .09; III, .3; IV, .135; V, .135; VI, .12; spur, .045 mm.; total length, .87 mm. Length of cauda, .3 mm.; nectaries, .022 mm.

Spring migrant.—Collected June 4, 1911, on terminal shoots of same host plant. General colour of head and thorax dark or dusky. Abdomen greenish brown, with colouring of white powder. Legs and antennæ, except tarsi and tips of third, fourth, fifth and six segments, light brown. Other parts dusky to black. Antennæ about one-fourth the length of the body. Head rounded in front and with a suture or line extending

from back to front midway between antennæ. Wings hyaline. The first anal and cubital veins quite distinct while the median with its two branches, remains only as faint lines. The nectaries of this form are cone-shaped with a flanged mouth and are apparently not placed as far forward as in the earlier forms. Cauda short and broadly angular.

Measurements: Length of body, 2.84 mm.; width, 1.09 mm.; length of wing, 3.65 mm.; width, 1.1 mm.; total wing expanse, 8.08 mm. Length of antennal segments, I, .66; II, .11; III, .44; IV, .154; V, .198; VI, .11; spur, .045 mm.; total length, 1.123 mm. Length of nectaries, .064 mm. Length of cauda, .22 mm.

The fall migrant was not secured.

Egg-laying female.—Collected on terminal shoots of above plant, Oct. 30, 1910, and Oct. 27, 1911, along with the alate males. General colour brownish with ash-grey powder on body, and with two more or less regular stripes down the back; and with a wide brown stripe extending across the body from one nectary to the other. At the base and above the cauda another transverse band is usually present. Antennæ and legs except tips, light brown; other parts dusky to black. Body robust and with large semi-conical nectaries which are brown in colour. Antennæ and legs hairy; antennæ one-third the length of the body.

Measurements: Length of body, 2.9 mm.; width, 1.7 mm. Length of antennal segments, I, .066; II, .09; III, .35; IV, .176; V, .176; VI, .11; total length, 1.013 mm. Length of nectaries, .06 mm., and cauda, .35 mm.

Alate male.—Collected on terminal shoots of host plant Oct. 30, 1910, and Oct. 27, 1911, about Corvallis, Oregon.

General colour: Head and thorax black with green abdomen. Abdomen with a series of black, transverse, more or less distinct, bands. Antennæ yellow at base, dusky at tip. Femora and tibiæ dusky at middle to black at ends; tarsi black. Wings hyaline but with costa dark brown, median vein and branches almost indistinct; other veins dusky. Nectaries slightly bell-shaped with a flanged opening. Third antennal segment about equal in length to fourth and fifth segments and with about 30 to 39 visible small circular sensoria. Fourth segment with 10 to 12 circular sensoria which appear slightly larger than those on the third segment. Fifth with about eight medium-sized, and one large, visible sensoria at the distal end. Sixth segment with one large and apparently six small sensoria at base of spur.

Measurements: Length of body, 2 mm.; width, .87 mm. Length of wing, 3.87 mm.; width, 1.52 mm.; total expanse, 8.61 mm. Length of antennal segments, I, .066; II, .11; III, .51; IV, .242; V, .3; VI, .154; spur, .066 mm.; total length, 1.448 mm. Length of nectaries, .045 mm.; cauda, .176 mm.

Females along tips of needles, depositing from 5 to 8 eggs.

Lachnus occidentalis Davidson.

Quite abundant in spring and fall on the terminal shoots, where it causes the undersides of the twigs to appear bluish or smoky.

Stem-mother.—Collected on *Abies grandis*, near Corvallis, Oregon, March 18, 1911. Gregarious individuals from just hatched to two-thirds grown. Colour dark brown, body pruinose. Head and legs black except tibiae, which are dark brown. Body with four rows of spots on the abdomen, which resemble dried spots of some white crystalline substance. The more mature specimens taken later are darker and have more of the pruinose covering. The spots are more distinct, and the underside of the body and the sides are white with this covering.

Measurements: Adult females. Length of body, 3 mm.; width, 2 mm. Length of antennal segments, I, .09; II, .09; III, .35; IV, .154; V, .198; spur, .198 mm. Spur tapers into joint so that it is not distinct from segment. Total length, 1.08 mm.; length of cauda, .27 mm. Nectaries small, cone-shaped, with chitinous ring at opening. Body, antennae and legs bearing long hairs.

Spring migrant.—Found on twigs, on underside, and causing bluish colour intermixed with white flocculent castings of Aphids.

General colour; head black; rest of body dark green but whitish in appearance from flocculence which covers body and legs. Legs and antennae light brown with dark joints, tarsi dark to black. Antennae slender and apparently without sensoria except one large one at the distal end of the fifth segment. Third segment the longest and about equal to four and five in length. Nectaries cone-shaped, placed on the side of the body and much larger than those of the apterous forms. Fore wings with the median vein and branches indistinct, present as a mere outline. Hind wings with normal venation of two oblique veins.

Measurements: Length of body, 2.1 mm.; width, 0.9 mm. Length antennal segments, I, .066; II, .09; III, .44; IV, .176; V, .22; VI and

spur, .22 ; total length, 1.172. Length of wing, 4 mm.; width, 1.5 mm.; total expansion, 8.75 mm. Length of cauda, .22 mm. Body, antennæ and legs bearing long hairs.

Fall migrants not obtained.

Oviparous female.—Collected at Corvallis, in colonies on under side of small twigs. Egg deposition takes place on the needles and they are laid in a row, about five being the most found on any one needle.

General colour brown, with white powdery wax on dorsal and ventral parts of body. That on the ventral part is thicker than above and extends half way up the sides. The characteristic rows of spots as are found on all the apterous forms of this species are found on the dorsum. This form is smaller than the viviparous forms.

Measurements: Length of body, 2.8 mm.; width, 1.7 mm. Length of antennal segments, I, .066 ; II, .09 ; III, .33 ; IV, .176 ; V, .198 ; VI and spur, .176 mm. ; total length, 1.036 mm.

Alate male.—Collected near Corvallis, Nov. 3, 1911, on same tree that the spring forms were collected on. Only a very few specimens found and these were so active and so small as to be not readily located.

General colour of body, green. Head and thorax dusky. Antennæ and legs dusky. Body almost hid in white, fluffy threads of wax which also appears on the legs. Head almost as wide as thorax. Antennæ reaching to abdomen and with small circular, raised sensoria on the third, fourth and fifth segments. From top view there are shown about sixteen on the third segment, eight on each side ; the fourth has about seven to nine, and the fifth has none in one specimen and apparently three in another. The wings are large in proportion to the body and the veins are but lines, the median veins almost obsolete. Nectaries cone-shaped with flanged opening and placed on the side of the body. Cauda more distinct than in other forms and broadly angular.

Measurements: Length of body, 2 mm.; width, .78 mm. Length of antennal segments, I, .066 ; II, .066 ; III, .33 ; IV, .154 ; V, .154 ; spur, .176 mm. Total length, .946 mm.

Egg.—Size not ascertained but they are covered with a powdery-like substance and resemble the eggs of *Longistigma caryæ* Harris.

Originally described by W. M. Davidson, Journal of Economic Entomology, Vol II, p. 300, 1909.

GEOMETRID NOTES—TWO NEW HYDRIOMENAS.

BY L. W. SWETT, BOSTON, MASS.

(Continued from page 164.)

Hydriomena transfigurata, nov. sp.

Palpi moderate ; expanse of wings 29–30 mm.

Colour of fore wings greenish gray, in faded specimens yellow or reddish mixed in with the green. Possibly there are red and yellow varieties in series. The fore wings are quite pointed, much more so than in *H. autumnalis*, and the hind wings are quite dark. Basal band in fore wing black, running diagonally from costa to inner margin, with a slight projection at R. The basal band is more regular than in *autumnalis*, and the space between is greenish gray, where in *autumnalis* it is clear gray. The mesial band of *transfigurata* is broader than in most species of *Hydriomena*, and the usually characteristic watery, irregular central band is almost lacking or can be just faintly discerned. The general colour of the entire mesial band is green, with scarcely any central band, or, if present, represented by a round spot or series of spots. Outer or intradiscal band quite regular, running diagonally, almost directly from costa to inner margin, which it strikes farther out than in *autumnalis*. There is also a tendency in almost every specimen for the intradiscal line to unite with the extradiscal at C_1 and C_2 . Discal space greenish gray with linear discal line. The extradiscal line is irregular, and is farther in from the apex of the wing than in *autumnalis*. It has also a tendency to unite with the intradiscal line near the inner margin. Outer marginal space greenish gray, with a faint trace of a black, irregular, watery line, which is narrower than in *autumnalis*, and appears as a mere trace, where in *autumnalis* it is very striking.

Hind wings quite dark and smoky gray, the usual two dark lines hardly visible.

Beneath, the markings of the fore wings shows through faintly ; general colour ash-gray, speckled with black atoms. On the hind wings only the extradiscal lines show, and these but faintly.

This is a very peculiar species, quite distinct from *autumnalis*. It resembles *californiata* Pack. closely in some respects, but differs in the time of its appearance, as well as in the markings.

My attention was first attracted to this species by a unique specimen from Newfoundland, taken by Mr. Owen Bryant in early August, which I could not associate with any other. Later, my friend, Mr. William Reiff,

June, 1912

turned up four specimens at Forest Hills, and Mr. Bryant seven males at Cohasset, Mass., and I also took a few myself.

This seems to be a very early species, occurring with *ruberata*, and seems distinct enough from *H. autumnalis* to deserve specific rank. The peculiarly shaped fore wings, the broad mesial band and the tendency for the extradiscal and intradiscal lines to unite near the inner margin will help to separate it from any other species.

Type ♂, Forest Hills, Mass., May 16, 1911; type ♀, Forest Hills, Mass., May 11, 1911. Paratypes, 8 ♂s, 3 ♀s, Newfoundland in August; Forest Hills, Mass., May 5-11, 1911, and Cohasset, Mass., May 10, 1907, in coll. Boston Society of Natural History.

BOOK NOTICE.

MEMOIRS ON THE COLEOPTERA. By Col. Thos. L. Casey, Part III, 1912. The New Era Printing Co., Lancaster, Pa.

The third part of these Memoirs has been recently issued, the first and second parts having been published in 1910 and 1911 respectively.

This last one treats of three different families, viz: "A Descriptive Catalogue of the American Byrrhidæ," "A Revision of the American Genera of the Tenebrionid Tribe Asidini," and "Studies in the Longicornia of North America."

The first mentioned is a revision and synopsis of the family, occupying 67 pages, in which are fully described 6 new genera, 4 new subgenera, 48 new species and 10 new subspecies.

The second is a study in the tribe Asidini of the family Tenebrionidæ; to this is devoted 155 pages, in which are fully described 14 new genera, 129 new species and 28 new subspecies.

The third being studies commencing with the family Spondylidæ and embracing the Cerambycidæ as far as the genus *Microclytus*, 162 pages are devoted to this portion, in which are described 19 new genera, 4 new subgenera, 170 new species and 39 new subspecies.

In addition to the new genera and species, many of the older ones are described and very many useful notes are interspersed throughout; the whole forming a valuable addition to the literature on these families.

J. D. E.

Mailed June 12th, 1912.

The Canadian Entomologist.

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No. 7

NEW SCOLIOIDEA.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

The following notes and new species apply to that section of the fossorial Hymenoptera, in which the pronotum reaches back to the tegulæ. Ashmead transferred them to the Vespids, in a superfamily, but they have little affinity with them in most of their structure, and most authors still keep them in association with the other fossorial Hymenoptera.

PSAMMOCHARIDÆ

Priocnemis Schiödt.—This name should be used instead of *Cryptocheilus* in my table to genera (Journ. N. Y. Ent. Soc., 1911, p. 222). The type of *Cryptocheilus* is *C. annulatus* and in this species (which I have recently obtained) the hind tarsi have spines below on the last tarsal joint; thus *Cryptocheilus* will replace *Priocnemoides*, at least until this genus is divided.

Priocnemis semitincta, n. sp.—Similar to *P. arcuata*, but the wings are faintly uniformly tinged with yellowish, not darker at tip. The spurs are nearly as dark as the legs, and the second recurrent vein curved outward. The posterior margin of pronotum hardly angulate.

Length 8 mm.

From Las Vegas, N. Mex., 23rd July, 1902 (Osler).

Priocnemis directa, n. sp.—Similar to *P. arcuata*, but the spurs are about as dark as the legs (pale in *P. arcuata*) and the hind margin of the pronotum is strongly angulate; the wings are coloured as in *P. arcuata* but the second recurrent vein is straight, not bent near tip as in *P. arcuata*.

Length 10 mm.

From Lee Co., Texas, Aug., Sept. (Birkman).

Priocnemis minorata, n. sp.—Similar to *P. conicus*, and runs to it in my table (Journ. N. Y. Ent. Soc., 1911, p.) but it has only about eight teeth on the hind tibia above (in *P. conicus* there are 10) and in this species the teeth are not nearly as long as the space

between them, while in *P. conicus* they are as long. This species is also much smaller. The wings are dark, but darker on tip than elsewhere; the basal vein curved, and the clypeus truncate.

Length 10 mm.

From Great Falls and Falls Church, Va., in April.

Priocnemis relictæ, n. sp.—Similar to *P. germanus* but much smaller, and the legs more brown; the hind tibia has only about six teeth above, and these very weak (in *P. germanus* stronger and about ten present); the veinlet between the second and third cells is nearly straight and the second recurrent vein arises but little beyond the middle of the anal cell; clypeus hardly truncate.

Length 6 mm.

From Sea Cliff, N. Y., in September.

Psammochares georgiana, n. sp.—Black, except the abdomen which is entirely reddish; and the hind tibiæ and tarsi are also reddish, the latter with the tips of the points black. The third joint of the antennæ is not quite as long as the width of the vertex. The metanotum has a broad, deep, median furrow; the long spur of the hind tibia is about two-thirds the length of the metatarsus; and the third submarginal cell is no longer than the second, and with a very oblique vein on the outer side. The structure is very similar to *P. fuscipennis*, but the lateral ocelli are plainly nearer to the eyes than to each other; the abdomen has a compressed tip.

Length 12 to 14 mm.

From Bainbridge and Pomona, Ga., Sept. (Bradley), and Southern Pines, N. Car., June, Aug. (Manee).

Pseudogenia nanella, n. sp.—Bluish or purplish and black, clothed with whitish hair, dense on the clypeus; pronotum arcuate behind; metanotum grooved; abdomen polished; wings hyaline, venation black; third submarginal cell much longer than broad, its outer side very oblique; long spur on hind tibia nearly one-half the length of the metatarsus, latter not spined, with only very short, fine bristles. Similar to *P. architecta*, but uniformly much smaller, the face much more narrow, being as high as broad; antennæ less slender, the third joint but little longer than the fourth; and few if any long hairs above on the basal segment of the abdomen.

Length 6 to 7 mm.

From Sea Cliff and Ithaca, N. Y., Great Falls, Chain Bridge and Glencarlyn, Va., June to Sept.

SCOLIIDÆ

The true Scoliidæ are most easily recognized from all other families of this superfamily by the striated nature of the apical part of both wings. The strongly emarginated eyes also distinguish them, but some other forms have the eyes slightly emarginate.

SCOLIA

The species of *Discolia* have in the female a smooth macula on the sides of the second abdominal segment; it is less distinct in the male. Our species of this section known to me may be tabulated on colour marks as follows:

1. No pale marks on head or thorax; costal area, venation and the entire wing black.....2.
Pale marks on head or thorax.....6.
2. Abdominal segments fringed with black hair; abdomen black at tip..3.
Abdominal segments fringed with fulvous hair; abdomen reddish at tip.....4.
3. Broad, white bands on second and third segments, no spots on venter.....*bicincta* Fabr.
White spots or band on first segment; bands on second and third segments more or less broken into two spots; two spots on second ventral segment.....*undata* Klug.
Widely separated white spots on sides of several segments, sometimes only on third; no ventral spots; abdomen more elongate...*guttata* Burm.
4. No yellow spots on abdomen, more than apical half reddish.....*hæmatodes* Burm.
Yellow spots on third, sometimes also on fourth segment.....5.
5. Black hair above on fourth and fifth abdominal segments; second segment usually black.....*dubia*.
Only reddish or yellowish hair on fourth and fifth segments; second segment more or less reddish (from Palmerlee, Arizona)...*thalia*, n. sp.
6. Abdominal segments margined with dark or black hair; second and third segments with yellow spots; wings and venation all black.....*nobilitata* Fabr.
Abdominal segments fringed with fulvous hair.....7.

7. Venation dark, costal area (except base) black.....8.
 Venation largely yellow, costal area yellowish to the stigma.....9.
8. Large yellow spots on second segment, spots or bands on third and fourth..... *consors* Sauss.
 No yellow spots on second segment, which is reddish; spots or bands on third and fourth segments.....*amæna* Cress.
9. Abdomen reddish, with spots or bands of yellow on second, third, fourth and fifth segments; metanotum and head mostly reddish.....*ridingsi* Cress.
 Abdomen with second and third segments black, with separated yellow spots; metanotum and head mostly black.....*lecontei* Cress.

S. flavicostalis Cress. is probably the male of *S. lecontei*; *S. inconstans* Cress. runs to *S. lecontei* but has no spot on the second segment; *S. amæna* may be only a variety of *S. consors*.

Trielis hermione, n. sp.—Black, densely clothed with long white hair; that on the posterior margin of segments three to five black, on sixth and seventh segments all black hair. Clypeus white, with a median black spot reaching to the front margin; a small spot each side above clypeus near the eyes, and sometimes a median one below the antennæ, white; pronotum with white band above reaching back to the tegulæ, but each side is excised below before tip; band or spot on scutellum, and the post-scutellum whitish. Abdomen segments one to four with a white sub-apical band, narrowed in middle, the first sometimes interrupted; on fifth segment a median transverse spot, and a dot on each side; venter usually with narrow apical bands on third to fifth segments, and spots on the second, sometimes some or all bands absent. Femora black except white apical spots, hind tibiæ mostly blackish, and front tibiæ with black behind; rest of legs pale yellowish; all densely white haired. Wings nearly hyaline, stigma and venation brownish yellow; third submarginal cell ends at about middle of lower edge of marginal cell. It is higher than broad and nearly twice as broad above as below.

Length 12 to 14 mm.

From Southern Pines, N. Car., June (Mauee).

Dielis fulvopilosa, n. sp.—Black, densely clothed with long fulvous hair; the ocellar region, posterior slope of metanotum, most of pleura, and inner posterior side of femora mostly free of hairs. Abdomen with fulvous hair at tip of segments, very dense near tip; rest of surface with pale

yellow hair. Venter with fulvous hair at tips of basal segments, the apical third almost covered with fulvous hair. Tarsi yellow; tibial spurs yellow; basal abdominal segment with two transverse yellow spots behind, not quite touching. Second and third segments each with two large yellow spots nearly reaching base, and more widely separated in front than behind, and each rather notched on inner side. Pygidial area covered with short scale-like tanny hairs. Head and thorax coarsely punctate, but the lower part of metanotal slope smooth; abdomen with scattered finer punctures; venter more coarsely punctate, second ventral with a transverse smooth area. Posterior side of hind femora smooth, except punctate near base and a streak of punctures reaching toward the tip; tibial spurs long, slightly spatulate at tip; antennæ short, curved and heavy, basal joints punctate. Wings slightly smoky, the costal area fulvous and with fulvous hair; beyond stigma is a dark cloud.

Length 16 mm.

From Palmerlee, Arizona. Similar to *Elis limosa* Sauss., but the abdomen marked differently, and that species has sharp pointed spurs and more white hair on femora and venter.

TIPHIIDÆ

Scoliphia, n. gen.—With the venation as in *Epomidiopteron* and *Paratiphia*; with marginal cells in female open, in male closed, first cubital cross-vein not reaching across; the first recurrent vein curved back above; stigma very small in both sexes. Mesonotum with a sulcus each side; tegulæ extremely long, twice as long as broad. Basal abdominal segment with a transverse carina, truncate in front; second ventral produced prominently in front. The large tegulæ and second ventral segment like *Epomidiopteron*; but the carina on basal segments like *Paratiphia*. In general appearance it is like *Epomidiopteron*.

Scoliphia spilota, n. sp.—♀ black; coarsely punctate; a white spot on each side of clypeus, on each humerus of pronotum, on mesopleura, a median spot on scutellum and postscutellum; spot on each side of basal three segments of abdomen, that on the second largest; sixth segment white across base; wings black, violaceous. Clypeus elevated, rounded below, a faint transverse furrow above the ocelli, head sparsely gray-haired, pronotum with anterior carina black-haired above, mesonotum smooth in middle, likewise on scutellum and postscutellum; latter with a pit each side. Metanotum with large basal area coarsely confluent punctate and

rugose ; sides smooth except behind, posterior surface margined by a carina which is emarginate above, the enclosed area punctate only on the sides. Segments of abdomen with smooth posterior margins, first segment more coarsely punctate, apical segments with transverse median row of black hairs, black hairs on sides and on venter ; second segment nearly as long as broad ; ventral segments with apical margins also impunctate ; legs with white hairs, tibial spurs two-thirds of metatarsus. Wings with second discoidal more than twice as long as broad, third cubital much longer than broad, receiving the second recurrent vein at the middle, second cubital longer than the first. Male similar to ♀ ; more slender and scutellar spots often absent ; clypeus wholly white ; basal area of metanotum with two submedian carinae, the whole metanotum more hairy than in female. In the female the last dorsal segment is roundedly produced at tip, basal half before the row of bristles coarsely punctate, beyond extremely finely punctate. In the male the last dorsal segment is coarsely punctate, black-haired, a median carina on apical half ; the curved apical spine lying in a groove of the tip and barely visible.

Length ♀ 20 mm., ♂ 16 mm.

From Palmerlee, Arizona (Biederman).

In markings this is close to *Epomidiopteron juli* of South America, but differs in markings from *E. elegantulum* as well as in sculpture and structure.

THYNNIDÆ

Glyptometopa eureka, n. sp.—Reddish yellow throughout ; smooth, but with distinct, rather large, sparse punctures, and sparsely clothed with long white hair. Antennæ 12-jointed, no longer than width of head, first segment longest, punctate in front ; practically no clypeus, the antennæ close down to the margin ; mandibles long, broadest near tip where they are angulate on inner side and thence concave with a minute tooth to the acute tip. Head flat above, nearly twice as wide as long, a curved punctate groove on each temple, not fringed with hair ; many punctures between eyes, a few on vertex behind. Pronotum three times as broad as long, but little punctured ; the mesonotum shorter than pronotum, the pleura strongly produced in a vertical ridge fringed with erect white hairs. Metathorax about as long as the prothorax and mesothorax together, broadest behind where the sides are rounded, sparsely coarsely punctate all over, the posterior surface sloping. Abdomen as long as head and

thorax together, slender, second and third segments about of equal width, each segment with a bowed finely punctate transverse line before tip; the first segment more densely punctate especially on the sides than the others and with a dark spot on the side at tip, on lower sides with three straight carinæ from base toward this dark spot, the upper carina well separated from the others, which are close together and parallel; last dorsal segment elongate, triangular, convex, with a median ridge on apical part and a few punctures each side near tip. A distinct bilobed process between the middle coxæ; legs short, middle and hind tibiæ spinulose on the outer sides, the spurs long, tarsi slender.

Length 12 mm.

From Palmerlee, Arizona, Sept. (Biederman).

Differs from type in larger size, in more punctate body, much broader head (compared with length), etc. This is the third Thynnid described from north of Mexico.

SAPYGIDÆ

Eusapyga carolina, n. sp.—♂ black; a transverse curved band on margin of clypeus, a large transverse spot above antennæ with a median upper projection, the blister each side by upper part of eye, and a stripe each side on the scape, yellow. Thorax with an interrupted band on front of pronotum, a band behind, two spots on the scutellum, two on the post-scutellum, a large spot on mesopleura and a rather smaller one on meta-pleura, yellow. Abdomen with a large spot each side on basal segment, two dots near middle of hind margin, second segment with broad, straight band over rather more than apical half, third with dot in middle near hind margin, fourth and fifth with narrow undulate bands, yellow. Venter black, with lateral yellow spots on second to fifth segments, growing smaller behind. Legs yellow, femora and coxæ mostly black, middle coxæ mostly yellow. Wings fumose, very dark in anterior part, stigma yellow. Body clothed with short, dense, mostly white hairs, head and thorax densely coarsely punctate. Clypeus with a minute tooth each side near middle on lower margin; the posterior pair of bosses on vertex are larger than the others; abdomen beyond first and second segment mostly smooth, the punctures on hind border of first segment rather large, this segment concave in front above.

Length 10 mm.

Southern Pines, N. Car., Aug. (Manee).

NEW GENERA OF NORTH AMERICAN LITHOBIIDÆ¹

BY RALPH V. CHAMBERLIN, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA.

(Continued from p. 178)

Genus *Gosibius*, gen. nov.

Anterior margin of the prosternum wide. Teeth, $2 + 2$; small, the line of apices clearly recurved; ectal spines springing from a rounded nodule, long and slender, being much more slender than the teeth, but stouter than the bristles.

Antennæ long, the articles all long and slenderly cylindric.

Coxal pores circular, uniseriate.

In the known species the last four pairs of coxæ are armed laterally. The penult legs bear two or three claws and the anal one or two. In both males and females the anal legs are armed dorsally with 1,0,3,2,2 spines, as are also the penult. Characteristic also of this genus is the presence on the tibiæ of most of the legs (e.g., the 5th to 12th pairs), of three ventral spines, as against but two in the related genera. The posterior legs are short and slender, with the prefemur and femur, and also sometimes the tibia, of anal pair more or less longitudinally furrowed above: in the male the penult legs always unmodified, and the anal legs also unmodified or with the femur alone modified, being then widened and complanate and more distinctly furrowed dorsally.

Gonopods of female nearly as in related genera, the claw being large and entire and the first article conspicuously excavated on mesal side of base, which side is also strongly chitinized. Basal spines, $2 + 2$ or $3 + 3$.

The species of this genus are less strongly narrowed cephalad than those of *Arenobius*, and the first plate is nearly as wide as or wider than the third.

Type.—*G. paucidens* (Wood).

Distribution.—Southern California, etc.

In addition to the type only one species, *G. monicus*, Chamb., is at present known, with certainty, though mutilated specimens from Los Angeles seem to represent a second.

1. Owing to a mistake of our own, the several new species of *Arenobius*, to have been described below, have been published elsewhere by Mr. Chamberlin. We regret the awkward division of the article which our error has necessitated.—[EDITOR.]

A NEW PALÆARCTIC *GERANOMYIA* (TIPULIDÆ,
DIPTERA).BY C. P. ALEXANDER AND M. D. LEONARD, ITHACA, N. Y.¹

The following species is described from material sent to the authors by Prof. Dr. M. Bezzi. It was received by him from a correspondent in Ile Djerba, off the northern coast of Africa. Our thanks are due to Dr. Bezzi, and we take pleasure in dedicating this interesting species to him.

Geranomyia bezzii, sp. n.

Male (alcoholic). Colour light yellow; proboscis with a brown subapical band; thoracic dorsum with four longitudinal brown stripes; pleuræ with a few dark brown spots. Wings hyaline with four rather indistinct spots.

Length, 7.2–7.5 mm.; wing, 6.3–6.4 mm.; head, total, 2.2 mm.; thorax, 1.7 mm.; hind femora, 5 mm.

Head: Proboscis light yellow, with a conspicuous, brown, subapical band; palpi brown; antennæ yellow. Front, vertex and occiput light brownish yellow.

Thorax: Ground colour yellow; dorsum with two median and two lateral brown stripes. Mesothoracic præscutum pale yellow, with two brown longitudinal bands, a little wider than the dividing median line, these bands darker on the outer margin; they begin near the cephalic margin of the sclerite and continue caudad, fading out at about two-thirds the length of the sclerite. Just cephalad of the end of the median stripes begin the dark brown lateral stripes; on the præscutum they are arcuated, continuing back onto the scutum, where they are also broader; end of the scutellum darker brown on either side of the pale median line; caudal edge of the postnotum dark brown. Pleuræ concolorous with the dorsum, lateral margin of the mesothoracic præscutum dark brownish black, most intense on the margin of the sclerite; an intense brown semilunar mark on the pronotal pleuræ, midway between the anterior coxæ and the dark mark on the edge of the mesothoracic præscutum; an irregular, interrogation-like mark below the wing root; ventral portion of the mesothoracic episternum and sternum brown. Halteres light yellow, knob clear yellow. Legs light brownish yellow, tips of the segments not appreciably darker.

Abdomen yellow, with a brown mark on the ventral edge of the tergites, the first elongate, expanded over two segments; behind this there

1. Contribution from the Entomological Laboratory of Cornell University.
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are five marks on successive segments. On the dorsal edge of the sternites are six corresponding marks, rather less distinct than the tergal marks. Hypopygium light yellow, fleshy apical appendages almost white.

Wings: Hyaline or nearly so; veins light brownish yellow; very pale brown clouds around the base of R_s , around cross-vein r , and in the middle of cell Sc . Venation: Sc ending about opposite the origin of R_s ; Sc_2 slightly retracted proximad of the origin of R_s , about one-half the length

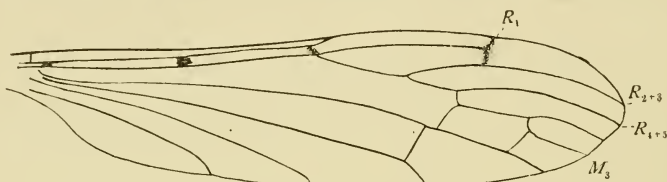


FIG. 6—Wing of *Geranomyia bezzii*, sp. n.

of Sc_1 . R_s moderately long, about twice the length of the basal deflection of R_{4+5} ; cross-vein r at the tip of R_1 , which is abruptly upcurved beyond it, very indistinct; R_{2+3} and R_{4+5} arcuated and parallel; cross-vein $r-m$ short, pale; basal deflection of Cu_1 about equal to Cu_2 ; Cu_1 fusing M distad of the fork M .

Holotype, ♂, Ile Djerba, Tunis. (Museo Torino.)

Paratype, 3 ♂s, Ile Djerba, Tunis. (One in Museo Torino, two in Cornell University.)

Remarks: Some venational variation occurs in the paratypes. In some Sc_2 is exactly opposite the origin of R_s , and Sc_2 is only a little shorter than Sc_1 ; basal deflection of Cu_1 at the fork of M , or even slightly proximad of it. (See figure.) The relative length of Cu_2 and the basal deflection of Cu_1 varies somewhat, Cu_2 , however, being generally a little the shorter.

Key to the Palearctic Geranomyia:

1. Wings unspotted.....(No Palearctic species).
Wings spotted..... 2.
2. Thoracic dorsum without distinct stripes..... 3.
Thoracic dorsum with distinct stripes..... 4.
3. Antennæ and palpi yellowish brown; femora and tibiæ black at tip.....*atlantica* Woll.¹

1. Wollaston—Ann. Mag. Nat. Hist., ser. 3, I, p. 115 (as *Limnobia*), (1858).

- Antennæ and palpi black ; femora and tibiæ not black at tip..... *canariensis* Bergr.²
4. Thoracic dorsum with two dark stripes..... *bivittata* Becker.³
 Thoracic dorsum with more than two dark stripes..... 5.
5. Costal margin of wings with six large equidistant brown spots..... *caloptera* Mik.⁴
 Costal margin of wings with four spots..... 6.
6. General colour yellowish brown ; proboscis unicolorous... *unicolor* Hal.⁵
 General colour light yellow ; proboscis light yellow, with a dark sub-apical band..... *bezzii*, sp. n.

This key is based entirely on the published description of the species hitherto proposed. Some of these descriptions are very insufficient, for example, those of *atlantica* Wollaston and *unicolor* Haliday. One, *maculipennis* Curtis,⁶ is so brief and unsatisfactory that we have not attempted to include it in the above key. The complete description reads as follows : "Rather larger than *G. unicolor*, and is of a lurid ochre, the wings tinged with the same colour. It may be merely a variety, differing principally in colour, arising possibly from age.

Whether or not *Aporosa* Macq. (1838), in which Enderlein has placed *maculipennis* Macq. (= *canariensis* Berg.) and *vicina* Macq., is distinct from *Geranomyia* is uncertain. The character of a radial cross-vein should be sufficient to distinguish this group of species from the typical *Geranomyia* group. Enderlein⁷ states that *vicina* has but one marginal cell ; however, Macquart (Diptères Exotiques, V, 1, pt. 1, p. 70), states clearly that there are two marginal cells. It is doubtful whether *vicina* is a *Geranomyia* ; the statement of "rostre un peu alongé" being quite insufficient to give it a position in the genus *Geranomyia*.

Acknowledgements are made to Mr. Frederick Knab for his kindness in supplying a reference not otherwise obtainable.

The drawing of the wing was made by means of the projection microscope in the Entomological Laboratory.

2. Macquart—Diptères Exotiques, Vol. I, pt. I, p. 63 (as *Aporosa maculipennis*) (1838) ; changed to *canariensis* by Bergroth, Wiener Entomol. Zeitung, Vol. 8, p. 118 (1889).

3. Becker—Berlin Mitt. Zoöl. Mus., Vol. 4, p. 187 (1908).

4. Mik—Verhandlungen Zoöl.-Bot. Gesellschaft Wien., Vol. 14, p. 791 (1864), as *maculipennis*, n. sp. ; changed to *caloptera* Mik, Verh. Zoöl.-Bot. Gesellschaft Wien., Vol. 17, p. 423 (1867).

5. Haliday—Entomological Magazine, Vol. 1, p. 155 (1833) ; Curtis, Brit. Entomol., Vol. 12, p. 573 (excellent coloured figure) ; Macquart, Suit. à Buffon, Vol. 2, p. 652 (1835).

6. Curtis—Brit. Entomol., Vol. 12, p. 573 (1835).

7. Enderlein, G.—Zoologische Jahrbücher, Vol. 32, part 1, p. 79, 80 (1912).

DRAGON FLIES COLLECTED AT POINT PELEE AND PELEE ISLAND, ONTARIO, IN THE SUMMERS OF 1910 AND 1911.

BY F. M. ROOT, OBERLIN, OHIO.

Lestes unguiculatus Hagen.—Point Pelee. One specimen.*Lestes forcipatus* Rambur.—Pelee Island. Very common.*Lestes vigilax* Hagen.—Point Pelee. Common around ponds.*Enallagma carunculatum* Morse.—Pt. Pelee. Fairly common near ponds.*Enallagma pollutum* Hagen.—Pt. Pelee. Fairly common near ponds.*Ischnura verticalis* Say.—Pt. Pelee and Pelee Island. Common.*Gomphus vastus* Walsh.—Pelee Island. Five specimens taken near woods.*Anax junius* Drury.—Pt. Pelee and Pelee Island. Common. (See note at end.)*Æschna clepsydra* Say.—Pelee Island. One specimen taken.*Æschna constricta* Say.—Pt. Pelee and Pelee Island. Fairly common. (See note.)*Epicordulia princeps* Hagen.—Pt. Pelee. Fairly common about large ponds.*Pantala hymenæa* Say.—Pelee Island. One taken, others seen. (See note.)*Tramea carolina* Linné.—Pt. Pelee. Rare. (See note.)*Tramea lacerata* Hagen.—Pt. Pelee and Pelee Island. Common. (See note.)*Celithemis eponina* Drury.—Pt. Pelee. Common near ponds.*Celithemis elisa* Hagen.—Pt. Pelee. Rare.*Leucorrhinia intacta* Hagen.—Pelee Island. Common at swamps.*Sympetrum rubicundulum* Say.—Pelee Island and Pt. Pelee. Fairly common.*Sympetrum vicinum* Hagen.—Pelee Island and Pt. Pelee. Very common. (See note.)*Sympetrum corruptum* Hagen.—Pt. Pelee. Rare. (See note.)*Erythemis simplicicollis* Say.—Pt. Pelee and Pelee Island. Common near ponds. (See note.)*Pachydiplax longipennis* Burm.—Pt. Pelee and Pelee Island. Common. (See note.)*Libellula basalis* Say.—Pt. Pelee and Pelee Island. Fairly common near ponds.

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Libellula incesta Hagen.—Pt. Pelee. Common at the ponds.

Libellula pulchella Drury.—Pt. Pelee and Pelee Island. Common. (See note.)

Plathemis lydia Drury.—Pt. Pelee. Rare, but seen regularly.

NOTE.—On Pelee Island in 1910, about the middle of August, or a little later, there were three days when dragon-flies of species hitherto not seen in large numbers swarmed around the end of the Point. Presumably they were migrating. The principal species concerned were *Anax junius*, *Æschna constricta*, *Tramea lacerata* and *Pantala hymenæa*.

On Point Pelee in 1911, about the middle of August, the deer-flies became suddenly much more numerous, and on August 17 great numbers of dragon-flies appeared (perhaps following the deer-flies). The great bulk of these were teneral *Anax junius* (with reddish-purple abdomens), and towards evening they clustered so thickly on the cedars near the end of the Point that eight or ten could be captured any time by a single sweep of the net. With them were large numbers of *Sympetrum vicinum* (which preferred the low junipers to the cedars) and smaller numbers of *Tramea lacerata* and *Æschna constricta*. There were also a few each of *Tramea carolina*, *Sympetrum corruptum*, *Erythemis simplicicollis*, *Pachydiplax longipennis* and *Libellula pulchella* with the flocks. They remained until August 20.

THREE DAYS IN THE PINES OF YAPHANK. RECORDS OF CAPTURES OF HEMIPTERA HETEROPTERA.

BY J. R. DE LA TORRE BUENO, WHITE PLAINS, N. Y.

The name Yaphank (with the stress on the “*hank*”) has a truly barbarous cadence. It is an interesting relic, one of the few remaining vestiges of the great Shinnecock tribe, once Lords of Long Island. The place that bears this cacophonous name is, indeed, one of the very few regions near New York and its teeming millions not utterly spoiled to the lover of nature by the “improvements” of modern progress as exemplified by its advance agents, the real estate dealers. Here and there in this land of sand and pines and scrub-oak, are still to be found ancient trees that stood when Hendrick Hudson first sailed into the Narrows. The present holders of the land are descendants of original Royal Patentees, and they own great stretches of wilderness. So it comes about that insect life is abundant in numbers and rich in species, not the least among them being the

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Hemiptera. The chief collecting grounds are about two miles from the railroad station and the vegetation consists mainly of pine, scrub oak and along the roads, maple trees, and the weeds and shrubs common to this latitude.

Toward the end of September, 1911, I had the good fortune to spend three days there with Mr. G. B. Engelhardt, who was guide, philosopher and friend. We arrived about 11 a.m. the morning of the 23rd, and indulged in a little collecting before the noon-day meal, after which we went out and did some sweeping and beating with good results, one being the capture of a new *Corizus*, described elsewhere. In the evening, between 8 and 10, Engelhardt went sugaring, carrying a trap lantern, while I swept. The following day was rainy in the morning, but as soon as it cleared up sufficiently we took our way to the Carman River, a clear, shallow stream flowing over a bed of sand where a little dredging was done, which yielded among other things one specimen of *Belostoma lutarium* Stal. (taken by Engelhardt), which is the farthest Northern authentic record for the species known to me. In the afternoon sweeping and beating made up the programme, in the brush and trees about a cranberry bog and in the grasses growing in it. Night sweeping gave good results, no less than 16 species being taken in clearings in the woods, while *Ozophora picturata* Say flew to light, its great agility making it hard to catch. The morning of the 25th dawned grey and muggy, the day finally clearing in the late afternoon. Sunshine or rain being one to the waterbugs, Engelhardt and I betook ourselves to the lake, where wingless *Rheumatobates rileyi* Bergr. was far from uncommon, but only one *Trepobates pictus* H. S. was seen, although I was out in a boat looking for it. Here, in the floating duck-weed and algæ I secured what seems to be a new species of *Microvelia*, in goodly numbers. On the way to and from the lake sweeping and beating were done with good results, and this part of the programme repeated in the afternoon yielded among other things, no less than 11 specimens of the new *Corizus*, 2 being fully winged, the other brachypterous. In the evening our stay was wound up by Engelhardt visiting his sugared trees, while I watched the trap light and caught two *Ozophora*. Altogether, in the three days, in spite of unfavourable weather, we got between us some 300 specimens and 82 species of Hemiptera. The identified species are listed here-

after, with appropriate comment. Many of these are recorded from Long Island for the first time, and some of the other records are unusual or remarkable.

Apateticus (= *Podisus*) *cynicus* Say.—Was taken at sugar in the evening—a most unusual manner.

Apateticus maculiventris Say.

Apateticus serieventris Uhler.

Apateticus modestus Dallas.

Apateticus placidus Uhler.

Halcostethus (= *Peribalus* M. & R.) *limbolarius* Stal.

Trichopepla semivittata Say.

Euschistus euschistoides Voll. (= *fissilis* Uhler.)

Euschistus variolarius P. B.

Thyanta custator Fabr.

Nezara hilaris Say.—At sugar, taken by Mr. Engelhardt.

Dendrocoris humeralis Uhler.

Brochymena arborea Say.

Tetyra bipunctata Fabr.—Was taken at light.

Aradus shermani Heid.—This species was taken under bark of dead pine tree, a few adults and a number of nymphs in various stages. Apparently first notice other than the type locality in Pennsylvania.

Aradus cinnamomeus Panz.

Mezira granulata Say.

Corynocoris typhaeus Fabricius.—Swept from weeds in a dry field. This appears to be the preferred habitat of this species.

Alydus eurinus Say.

Alydus pilosulus H. S.

Megalotomus 5-spinosus Say.—Common on false indigo (*Baptisia tinctoria*). Some specimens were also swept at night.

Harmostes reflexulus Say.

Corizus lateralis Say.

Corizus hirtus Bueno.—In a sandy spot, in short grasses, by sweeping.

Jalysus spinosus Say.

Lygaeus kalmii Fabr.

Nysius providus Uhler.—Swept and taken at light.

Nysius thymi Wolff.

Ischnorhynchus geminatus Say.

Geocoris piceus Say.

Phlegyas abbreviata Uhler.—One long-winged specimen was swept.

Crophius disconotus Say.—Beaten from oak.

Ligyrocoris diffusus Uhler.

Pamera basalis Dallas.

Antillocoris (= *Cligenes*) *pilosulus* Uhler.—Taken by sweeping grasses in dry cranberry bog.

Pseudocnemodius bruneri Barber.—Two long-winged specimens were swept, one by daylight, the other at night. This is a pretty common and widespread species.

Carpilis ferruginea Stal.—Two specimens taken by sweeping in a marsh. This species has apparently not been recognized since Stal described it in 1874, in En. IV, pp. 144, 153. This is a notable addition to our fauna, and serves to show how little is known of the Hemiptera of any given region.

Ozophora picturata Uhler.—A number of specimens were taken at light and one was beaten from oak. This is a most agile species.

Drymus unus Say.

Corythuca juglandis Fitch.—Taken by beating.

Corythuca crataegi Morrill.—Taken by beating.

Corythuca pergandei Heidemann.

Physatocheila plexa Say.—Beaten from oak.

Reduviolus sordidus Rent.

Reduviolus fesus Linné.

Mesovelgia bisignata Uhler.

Rhagovelgia obesa Uhler.

Microvelgia americana Uhler.—There are also 3 seemingly undescribed *Microvelgiae*.

Gerris marginatus Say.

Gerris remigis Say.

Trepobates pictus H. S.

Rheumatobates rileyi Bergroth.—Abundant on the lake.

Nægeus (= *Hebrus* Curtis) *concinuus* Uhl.—Quite abundant on the damp edges of a cranberry bog.

Pygolampis, sp.—Nymph.

Pselliopus (= *Milyas*) *cinctus* Fab.—Beaten and swept. Found mating.

Zelus luridus Stal.—Nymphs.

Fitchia aptera Stal.—One large fully-winged female was swept in a little meadow.

Siena diadema Fab.

Sinea spinipes H. S.—Beaten from trees. Crandell states that this species ranges over the southern and central parts of the United States. It is now for the first time recorded from the northeastern part. It is a most interesting addition to the fauna of N. Y.

Ranatra americana Mont. (= *4 denta* Uhl., Bno. et auctt).

Triphleps insidiosus Say.

Piezostethus sp.—Beaten from pine, in company with *Aradus cin-namomeus*.

Cardiastethus sp.—One specimen only of this small species was beaten from pine.

Gelastocoris sp.—Nymphs in about 2nd instar were common, hiding in crevices in the debris at the shores of the cranberry bog. No adults were noted, whence it may be inferred they hibernate as nymphs.

Pelocoris femaratus P. B.

Belostoma flumineum Say.

Belostoma lutarium Stal.—The only specimen authentically northern of which I have any knowledge. This is a notable addition to the fauna of New York.

Corixa.—Two unidentified species.

Notonecta undulata Say.

Notonecta variabilis Filber.

Buenoa elegans Filb.

Plea striola Filb.—As usual, in water weeds.

There are in addition six species of Capsids not identified.

LEPIDOPTERA FROM YUKON TERRITORY.

BY ALBERT F. WINN, WESTMOUNT, QUE

Through the kindness of Mr. Lachlan Gibb, I have had the opportunity of studying a collection of butterflies and moths taken during the summer of 1910 at, or near, Dawson City, Y. T. A smaller collection was made in 1911 but butterflies must have been scarce last year, the collector having been out on 17 days and capturing but 54 specimens in all. As but little has been published in this magazine on the insect fauna of this northern part of our country, the list which follows, covering both seasons' captures may be of interest to entomologists studying distribution and particularly to those engaged on the preparation of the list of Canadian Insects.

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Papilio turnus Linn.—June 4th to 22nd, a number of specimens all small in size, average expanse $3\frac{1}{4}$ inches, but markings exactly the same as in those found about Montreal.

Papilio machaon var. *aliaska* Scud.—June 1912, one specimen.

Pontia napi var. *hulda* Edw.—May 15 to July 4, apparently the commonest butterfly about Dawson. Some of the females are darkly suffused and approach var. *heyoniæ*.

Pontia nelsoni Edw.—July 17th, one specimen only.

Euchloe ausonides Bdv.—June 15th to July 2nd, several specimens.

Colias chippewa Edw.—June 20th to July 17th.

Colias skinneri Barnes.—July 14th to August 1st, three ♂, one ♀.

Argynnis electa Edw.—July 20th, one ♂ in battered condition.

Argynnis frigga var. *saga* Kaden.—June 15th to July 7th, several specimens. Apparently a common species. One specimen has, in the black portion at base of pormiaries, a circular fulvous spot with two black dots.

Phyciodes pratensis Behr.—July 4th to 15th, three specimens.

Vanessa milberti Godt.—Several specimens, May 20th to June 18th, hibernated, fresh specimens July 17th to August 8th; exactly similar to those found in Eastern Canada.

Vanessa antiopa Linn.—Many hibernated specimens May 15th to June 26th; those taken after June 15th are in fragmentary condition. Fresh specimens July 27th to August 8th. Most of the specimens have the dark portion of the wings beneath marked with yellowish transverse striæ, in some forming a central band nearly as wide and distinct as outer border.

Coenonympha kodiak var. *yukonensis* Holland.—Three specimens, June 25th to July 2nd.

Erebia discoidalis Kirby.—Three specimens, June 15th to 20th.

Erebia disa var. *mancinus* Doubl.-Hew.—One specimen, rather broken, June 27th.

Erebia epipsodea Butl.—One specimen, June 22nd.

Encis jutta var. *alaskensis* Holland.—A number of specimens June 18th to July 2nd.

Chrysophanus helioides Bdv.—One female Aug. 5th, the latest date on any of the species of butterfly received. The specimen has a yellowish washed-out appearance.

Lycæna sæpiolus Bdv.—June 20th to 29th, several.

Lycæna lygdamus Doubl.—Several specimens more or less worn; 19th to 26th June.

Lycæna rustica Edw.—One ♂, July 22nd.

Lycæna lotis Lintn.—Several specimens, July 7th to 16th.

Lycæna pseudargiolus spring from *marginata* Edw.—One ♀ specimen much broken, June 19th.

Lycæna pseudargiolus, spring from *lucia*, Kirby.—The commonest form in the North, June 10th to 26th.

Carterocephalus palæmon Dallas.—One specimen, June 25th.

Thanaos persius Scud.—One specimen, June 23rd.

Deilephila galii Rott.—One specimen, July.

Rhynchagrotis rufipectus Marr.—Two specimens, July 22nd.

Noctua baju Linn.—Two specimens, July 12th to 22nd.

Noctua clandestina Harr.—One specimen, July 8th.

Leucania yuconensis Hamps.—Eight specimens mostly rubbed, July 1st to 15th.

Leucania commoides Guen.—One specimen June 28th.

Falcaria bilineata Pack.—One specimen June 18th.

Euchæa albovittata Hübn.—One specimen June 23rd.

Eustroma testata Linn.—One, Aug. 7th.

Eustroma propulsata Walk.—Several July 8th to 20th.

Eustroma nubilata Pack.—Four specimens July 8th to 14th.

Eustroma triangulata Pack.—Aug 2nd to 11th, several.

Keolexia scylina Hulst.—Apparently the commonest moth, many specimens July 26th to Aug. 8th.

Rheumaptera hastata Linn.—June 20th to July 2nd. As usual with this species in the west, most of the specimens are much marked with white.

Rheumaptera sociata Bork.—Four specimens, June 28th to July 2nd. The white band on fore wings is much more even and contrasting than in Eastern specimens.

Rheumaptera luctuata D. & S.—Several June 15th to 29th, very variable.

Mesoleuca silaceata Hübn.—Six specimens, July 16th to 28th.

Larentia multiferata Walk.—Several June 15th to 28th, all badly rubbed.

Hydriomena furcata var. 5-fasciata Pack.—Ten specimens, July 15th to 22nd.

Cænocalpe magnoliata Guen.—One specimen, June 20th.

Gypsochroa designata Haw.—Numerous specimens, June 15th to 28th.

Xanthorhoe convallaria Guen.—Twenty specimens, July 2nd to 20th.
A common species.

Xanthorhoe ferrugata Clerck.—Six specimens, July 19th to 26th.

Cosymbia lumenaria Hübn.—One specimen, June 20th.

Leptomeris frigidaria Moeschl.—Six specimens, June 29th to July 15th.

Eufidonia notataria Walk.—One specimen, June 23rd.

Sciagraphia granitata Guen.—One specimen, July 20th.

Sciagraphia denticulata Grote.—One specimen, June 19th.

Diastictis bicolorata Fabr.—Three specimens, July 15th to 22nd.

Diastictis inceptaria Walk.—Two specimens, July 12th; seem to agree with *argillacearia* Pack, which is considered a synonym of *inceptaria* Walk.

Diastictis subcessaria Walk.—One specimen, July 14th.

Gladela julia Hulst.—Three specimens, July 14th to 22nd.

Sicya macularia Harr.—One specimen, July 26th.

Metrocampa perlata Guen.—Eight specimens, June 30th to July 27th.

NEW NOCTUID SPECIES.

BY WM. BARNES, M.D., AND J. MCDUNNOUGH, PH.D., DECATUR, ILL.

Fotella olivia, sp. nov.

♀.—Head and thorax pale ochreous, more or less heavily sprinkled with dark gray, abdomen ochreous, untufted; primaries dark gray-brown, considerably sprinkled with pale ochreous scales, giving a general rough and mottled appearance; the ochreous scaling is often such that a basal dash of the ground colour is apparent, extending to below orbicular; t. a. and t. p. lines represented by a small dark patch on costa, the latter line at times being visible across wing as a row of dark dots bent inward in submedian fold; orbicular and reniform two small and rather diffuse whitish patches, not clearly defined, former with or without central dark dot; terminal area narrow, ochreous, defining, in contradistinction to dark subterminal space, the s. t. line, which is very irregular, angled outwardly below costa to nearly terminal border and slightly bent inward opposite cell and in submedian fold; terminal space broadest at costa; terminal row of dark dots; fringes dark, slightly dotted with ochreous. Secondaries dull white, slightly smoky outwardly. Beneath shiny white, with faint sprinkling of brown scales. Expanse 25 mm.

Habitat.—La Puerta Valley, San Diego Co., Calif. (G. H. Field, July.) Five ♀s. Type coll. Barnes. Cotype with Mr. Field.

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With the exception of the depth of ground colour of primaries, all the specimens are constant in markings. The species possesses a small frontal navel-like tubercle, and agrees generically with *fragosa* Grt., which we recently redescribed as *Hadenella cervoides*, differing from this species in the more mottled appearance, the pale terminal area and better defined orbicular. We place it in *Fotella*, as it seems to bear considerable resemblance to *notalis* Grt., the type of the genus; it is, however, to judge by the description, much smaller and has the orbicular present.

Phyllophila aleptivoides, sp. nov.

♀.—Thorax smoothly covered with flat gray and white scales; abdomen ochreous, primaries dark gray, mingled with white and ochreous; basal portion of costa broadly white; lower basal portion of wing between submedian fold and inner margin extending to t. a. line, ochreous; a broad wedge-shaped patch of dark gray extends obliquely inward from costa to submedian fold, broadest on costa and bordered outwardly by t. a. line; this latter very obscure, geminate; median area dark gray, sprinkled with white along costa and with ordinary spots prominent, white, ringed with black; orbicular round, with dark central dot; reniform constricted centrally, shaped like figure 8, with central dark dots in upper and lower halves; claviform oval, pure white, about same size as orbicular; between orbicular and reniform an ochreous patch; t. p. line geminate, indistinct at costa, inwardly oblique and semiparallel to outer margin; subterminal space ochreous, with the exception of a dark apical dash extending inward to t. p. line; terminal space narrow, dark gray, with terminal row of dots edged inwardly with white; fringes dusky. Secondaries smoky with whitish fringes.

♂.—Our single specimen differs considerably from the ♀, in that the whole median area is suffused with white, obscuring the three spots and leaving merely the two dark central dots of reniform visible; the dark costal patch near base of wing becomes on this account much more prominent; the secondaries are paler than in the ♀.

Beneath in both sexes dull white, immaculate. Expanse 19 mm.

Habitat.—La Puerta Valley, San Diego Co., Cal. (G. H. Field, July). One ♂, one ♀.

The species is distinctly quadrified in venation and would fall, according to Hampson (Cat. Lep. Het., Vol. X), close to the genus *Phyllophia* Gn., which as yet has no North American representatives. The front

of our species has a strong rounded frontal protuberance, the surface of which is roughened by numerous minute conical tubercles; the antennæ in both sexes are almost simple, and there are apparently no tufts of hair on any of the abdominal segments; in this latter respect it differs from *Phyllophia*, which possesses a dorsal crest at base, but we hesitate to separate the species on such a minor point of difference.

The species, especially the ♀, has considerable superficial resemblance to *Aleptina inca* Dyar. The ♂ type is with Mr. G. H. Field, the ♀ type in coll. Barnes.

Eustrotia bifasciata, sp. nov.

Head, thorax and abdomen white; primaries white, with sub-basal and subterminal areas dark brown, giving the impression of two irregular bands crossing the wing; base of wing narrowly white; broad dark sub-basal band bordered outwardly by geminate t. a. line, which is filled with ochreous and somewhat irregular in outline; about centre of costa is a small dark patch, and a black dot at end of cell represents reniform; t. p. line geminate, partially filled with ochreous, irregular, bent strongly inward in submedian fold; s. t. line defined by difference between dark subterminal and pale terminal spaces, very irregular, bent inward and closely approaching t. p. line opposite cell, almost touching outer margin at vein M_2 and again incurved above anal angle; slight dark terminal line; fringes white, with faint dark checkerings. Secondaries, basal half white; outer portion smoky brown with pale fringes. Beneath white, with a broad dark border to both wings. Expanse 20.5 mm.

Habitat.—La Puerta Valley, San Diego Co., Cal. (G. H. Fields, July.) Three ♂s.

Type coll. Barnes. Cotype with Mr. Field.

All three specimens are rather worn, and we have been unable to determine whether thoracic and abdominal tufts are present or not. As the venation is markedly quadrifid and the general appearance slight, we place the species for the present in *Eustrotia*. We know of no other species to which it bears much resemblance.

CORRECTION.

In our recent paper on North American Lepidoptera the description of *Diastictis pallipennata* (Vol. XLIV, p. 126), was drawn up from a ♀, and not a ♂, as stated.

J. M. McDUNNOUGH.

NOTES ON THE APHID GENUS, *ERIOSOMA* LEACH.

BY H. F. WILSON, OREGON AGRICULTURAL COLLEGE.

Eriosoma lanigera versus *Schizoneura lanigera*.

At various times since the description and naming of Housmann's *Aphis lanigera* different authors have erected generic names for this species.

There seems to be no doubt of the validity of the specific name for the species of *Aphis* originally described by Housmann as *Aphis lanigera*, but the generic names erected for this insect have been more or less in doubt.

The author of this paper has made a thorough investigation of all the known literature, and concludes that *Eriosoma* was erected and definitely placed with this species, and that *Schizoneura* and other later names are synonymic as far as this species is concerned. Samouelle is generally supposed to have originated the genus in his compendium of useful information, but such is not the case. In 1817 Sir Oswald Mosely gave a paper before the Horticultural Society of London, entitled, "*Aphis lanigera* or American Blight." At the end of this article a note is appended by Dr. William Elford Leach, in which he mentions *Aphis lanigera* of Housmann, and concluding that a new genus should be made for this species he proposes the name *Eriosoma*. The note appended to the original paper reads as follows: "Note on the Insect, by William Elford Leach, M.D., F.R.S., etc. The animal of which so accurate an account is given in the preceding paper is the *Aphis lanigera* of Housmann; it is described by the author in Illiger's Magazine for 1802, page 440, and is referable to Latreille's third division of the genus *Aphis*, but which division I consider to constitute a peculiar genus distinct from *Aphis*, and which I have named *Eriosoma*."

Eriosoma has its body covered by woolly matter; its abdomen has neither horns nor tubercles, and its antennæ are short. The body of *Aphis* is naked, its antennæ are long and setaceous, and the abdomen is furnished with a tubercle or horn-like process on each side.

Although this paper was read in 1817, it evidently was not published until 1818, in the latter half of that year. The entire article is printed in Volume III, Trans. Hort. Society, London, 1820, pages 54 to 61. The preface to this volume is dated January, 1820, but reads, "When the Society completed the second volume of their Transactions in March, 1818, arrangements were made to insure, if possible, the publication of

portions of the succeeding volumes, at less distant periods than had hitherto been done. They flattered themselves with the hope of being able to complete a volume every second year, by the publication of one-fourth part at intervals of six months, and it is very satisfactory that, so far, that hope has been realized."

The author takes this as sufficient proof to definitely establish this generic name.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

Meetings of the Entomological Society of Ontario were held during the winter months of 1911 and 1912 in the Biological Lecture Room of the Ontario Agricultural College. Before Christmas the meetings were held on alternate Thursday afternoons and after New Years joint meetings were held with the Wellington Field Naturalists Club, weekly. The meetings were well attended by the staff and students of the Ontario Agricultural College and interested citizens of Guelph. The first meeting was devoted to observations by the various members, and during the rest of the season the following papers were read in order.

Observations in Algonquin Park.—Prof. J. E. Howitt.

Foul Brood of Bees.—Mr. G. L. Jarvis.

Ants.—Mr. W. H. Wright.

The Nursery Question.—Mr. L. Caesar.

Mosquitoes.—Mr. C. A. Good.

The Economic Importance of *Calosoma sycophanta*.—Mr. J. Noble.

Insect Intruders in Indian Homes.—Mr. G. J. Spencer.

Birds in Relation to Insects.—Mr. E. N. Calvert.

Fall Collecting of Coleoptera.—Mr. A. W. Baker.

Insectivorous Birds.—Prof. T. D. Jarvis.

NOTE ON GEOPHAGUS.

Geophagus as a name for a genus of the Geophiloidae (Attems, 1897), is preoccupied by *Geophagus* in Pisces (Hæckel, 1840), and must accordingly be replaced. *Sogophagus* nom. nov., may be substituted.

R. V. CHAMBERLIN.

During July and August communications for the Editor may be addressed to the Biological Station, Go Home Bay, via Penetang, Ont.

NOTES ON THE LIFE HISTORY OF *ESTIGMENE PRIMA* SLOSSON.

BY ALBERT F. WINN, WESTMOUNT, Q.

My acquaintance with this "many-spotted ermine moth" was first made on June 12, 1897, when Mr. Dwight Brainerd and I visited the entomologically famous Gomin Swamp near Quebec city, under the guidance of Rev. Dr. Fyles, in search of *Æneis jutta* and other Lepidoptera. In one particularly moist spot my eye was attracted downwards and observed a pair of these moths in coitu. My first impression was that they must be a northern variety of *Spilosoma congrua* (*antigone*) with the black spottings exaggerated. The female was kept alive and laid a good supply of eggs which duly hatched, but through illness I was unable to attend to their needs. Mr. Lyman afterwards took the moths to Washington where Dr. Dyar determined them as *E. prima* Slosson. Figures of this species are given in this magazine, Vol. XXXII, pl. 4, figs. 9 & 10.

No further specimens came my way till June 4th, 1910, when at Shawbridge, Que., in the Laurentian Mts. about 40 miles north of Montreal I captured a battered specimen flying, or rather driven by the cold high wind. It was found to be a female and was therefore boxed for eggs. Three were laid almost immediately. Next day, June 5th, a batch of 45 was deposited; on the 6th, 27; on the 7th, 11; and on the 8th, 36. Total 122 eggs, all laid in daytime and arranged in irregular masses. The moth was then killed to preserve what little was left of it.

In order to have a better chance of breeding the larvæ I asked my friend Mr. Arthur Gibson of Ottawa to take half of the eggs, which he kindly consented to do. For some reason his little larvæ refused both plantain and dandelion, and of other foods offered they selected apple, but unfortunately soon died. I at once re-divided mine which were thriving on plantain and also gave about a dozen to Mr. Lyman who was just leaving on a trip to Europe. We all succeeded in rearing the caterpillars to full growth and into pupa, Mr. Lyman having considerable difficulty in obtaining a supply of plantain leaves in the beautifully kept lawns of England, but mine alone produced moths.

For various causes none of us kept a complete record of all the stages but for the following imperfect record I am indebted to both Mr. Gibson and Mr. Lyman for the notes they made which have been included with my own.

July, 1912

Egg.—Similar to other eggs of this genus in colour and shape, being dome-shaped; .815 mm. wide, .65 mm. high; appearing smooth to naked eye, but under microscope distinctly pitted all over with depressions of irregular shape. Colour pale honey-yellow when laid, turning buff colour after two days and gradually becoming darker through orange shades till a day before hatching when they appear nearly black. Laid in clusters side by side, on under side of a leaf in confinement. First larva hatched June 14, leaving little of egg shell except the base; duration of egg stage 10 days.

Stage I.—Length 2.25 mm nearly cylindrical, head slightly larger. Head black, shining, cordate; mouth-parts yellowish. Body whitish before feeding turning greenish, with black tubercles from which arise black and gray hairs. Legs black; prolegs grayish. Fed readily on common plantain (*Plantago major*).

Stage II.—Length 4.5 mm. Not much change noted in appearance but colour darker with faint dorsal stripe.

Stage III.—Length 7 mm. Head black, body cylindrical, blackish with tufts of black and grayish hairs from the conspicuous black tubercles. Segments 2, 3 and 4 pale orange with black spots, 11 and 12 similar. A pale yellowish dorsal band from segment 5 to 10.

* *Stage IV*.—Length 11 mm. Head black, mouth parts yellowish; body black with longitudinal stripes yellow, hairs black; legs and prolegs black.

Stage V.—Length 20 mm. No further notes taken.

Stage VI.—Mature larva (description by Mr. Arthur Gibson) "Length 38 mm. at rest, 45 mm. extended. Head 2.8 mm. wide, rounded, somewhat quadrate, conspicuously depressed at vertex, flattened in front, median suture pale, setæ dark brown, long and slender. Skin of body streaked and blotched with dark reddish brown. Dorsal stripe chrome-yellow, conspicuous, distinct on all segments, wider on abdominal ones. Tubercles jet black, each with a bunch of radiating stiff, barbed bristles mostly of uniform length. Tubercle I about one-half size of II; II larger than III; IV, V, VI, elongated. Bristles from tubercle I mostly silvery with a few black ones intermingled; from II, III and IV silvery and black in about equal numbers; from V and VI mostly silvery. Tubercle VII larger than VIII, bristles from these mostly black and short. An indefinite, broken yellow lateral line is also present, most apparent along upper edge of tubercle III. Spiracles

black, close in front of tubercle IV. Thoracic feet black, shiny, bearing short dark bristles; prolegs also black, claspers reddish, bristles dark."

The first of my larvæ began to make its cocoon on July 16th. Mr. Gibson's spun up on July 10th, July 11th and July 14th. Larval period in confinement 32 days; out of doors would probably be about 6 weeks.

Cocoon.—Oval, about 22 mm. long, 10 mm. wide; thinly made of brownish silk, in which the hairs from body are woven. The ends of many hairs project, giving the cocoon a spiny appearance. Some larvæ spun up between leaves, but the majority in corners of the boxes.

Pupa.—Length 18 mm., width 7 mm.; nearly black in colour inclined to dark crimson particularly on wing cases. Body closely punctured, thorax creased, spiracles pearly glistening. Cremaster short consisting of about 8 short stiff reddish capillate bristles.

The first moths emerged (in a cool cellar) on April 21st. The moth is doubtless single-brooded throughout its habitat, which seems to be limited to the northern part of Quebec and Ontario, westward to Winnipeg, Man.; and to the White Mts. of New Hampshire and the Adirondacks and Catskills of New York.

The larvæ are voracious feeders and never seem to stop eating day or night. When disturbed in their repast, or put upon a table for examination they are most active creatures. If a large plantain leaf or an arch made of a sheet of note paper be provided they lose no time in scurrying along to take refuge beneath it.

BOOK NOTICE

BUTTERFLY-HUNTING IN MANY LANDS. Notes of a Field Naturalist. By George B. Longstaff, M. A., M. D., Oxon.; F. R. C. P., F. S. A., F. G. S. Longmans, Green and Co., London, New York, Bombay and Calcutta. Price 21 s.

The writer of this volume has attempted a very difficult task—that of incorporating into a readable form the entomological diaries kept by him during many years of butterfly collecting in many lands. We think that, considering the difficulties presented by such an undertaking, he has been remarkably successful in carrying out his object, and we attribute this success largely to a marked literary sense and gift of narrative, of which he is the happy possessor. We fear, however, that

there are very few, even among entomologists, who will read the book from cover to cover; only such lepidopterists as are more or less familiar with the butterfly fauna of the entire world will find all of its chapters readable.

Dr. Longstaff's travels have taken him to India, Ceylon, China, Japan, Algeria, Egypt and the Soudan, South Africa, the West Indies, South America, Canada, Australia and New Zealand; so that he has enjoyed the somewhat unusual experience of having collected butterflies in every continent of the globe. His sojourn in Canada was limited to a rapid journey across the continent in 1904 on his return to England from the Orient and very little opportunity for collecting was had on the way, but in tropical countries Dr. Longstaff's experience has been wide and varied and he shows himself to be thoroughly familiar with butterfly life everywhere.

Many amusing anecdotes and interesting impressions of the various countries visited by the author, and of the customs of their inhabitants, are scattered through the volume, greatly helping to enliven it; while all that is of real scientific value is encompassed in the last chapter, entitled "Bionomic Notes". This chapter contains many interesting notes under the following headings: "The scents of butterflies"; "The coloured juice exuded by certain Lepidoptera"; "The tenacity of life of protected species"; "Butterflies bearing marks of the attacks of foes"; "Experimental evidence as to the palatability of butterflies"; "Mimics in the field deceiving man"; "Notes on the flight of sundry butterflies"; "Heliotropism"; "List and shadow"; "The inverted rest attitudes of Lycænids and some other butterflies"; "General remarks on rest attitude of butterflies"; "Cosmopolitan Lepidoptera"; "Seasonal dimorphism"; "The selection as resting-places of yellow leaves by yellow butterflies".

As a supplement translations by Ernest A. Elliott, F. Z. S., F. E. S., of a series of important papers by the late Fritz Müller on the scent-organs of Lepidoptera have been appended to the book, together with an introductory note by Prof. E. B. Poulton, by whose suggestion they were included.

The book, including the appendix and the very full index occupies 728 pages. It is illustrated by six good coloured plates, upon which many other insects besides butterflies are depicted, and 19 text figures. The appendix is also illustrated by nine lithographic plates.

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No. 8

GEOMETRID NOTES.

REVISION OF THE GENUS HYDRIOMENA HUB. GROUP WITH MODERATE PALPI.

BY L. W. SWETT, BOSTON, MASS.

8. *Hydriomena autumnalis* Ström (Det. Kgl. Danske Vid. Skrift. Selsk., p. 85, 1783). Palpi moderate.

We have generally regarded as typical *autumnalis* a grayish form with clear mesial space and slate-coloured bands, bordered with olive. It occurs in June and July in both Europe and America, but there is a May brood which we do not commonly get here. We imagine our species to be the same as the one that is found in Europe, but do we really know the form that Ström described as *autumnalis*? It seems strange that a geometrid occurring only in the early summer should be called *autumnalis*. This same doubt seemed to arise in the mind of a German specialist, for Hoyningen-Heune, in the Berl. Ent. Zeit., Vol. 51, p. 254, 1906, discusses this question, and pleads for the name *trifasciata* Bockhausen for this form. He claims it answers Bockhausen's description better than Ström's, which seemed to him to apply to some unknown or unrecognizable species, possibly *Larentia autumnalis* Bockhausen. Perhaps he is correct, but it would be hard to prove, as Ström might have called it *autumnalis* from his having found the larvæ in the fall or for various other reasons. Since nearly every collector recognizes it by the older name, *autumnalis*, and it is difficult to prove otherwise, I think it better to retain this name. The form found in America is very close to the European in colour and markings, but there are slight differences which, should the genitalia prove different, would refer it to *pluviata* Guenée (Phal., II, p. 378, No. 1505, 1857). Guenée states that the American form has more pointed fore wings, the lines are not so close together, and those bordering the mesial band are more oblique and that the median space is larger. He mentions having a specimen with the mesial space shaded with pink, and to this

form I have given the varietal name *perfracta* (CAN. ENT., XLII, p. 279, 1910). The differences that Guenée points out seem pretty constant, but the enlarged central band does not hold, as he has every variation of it among European specimens. The pointed wings and green or gray ground colour with slate-coloured bands seem to be rather distinctive of the American form; also the basal band is apt to be thicker and the first mesial more pronounced, but I think a careful study of the genitalia with extensive breeding will be necessary before we can be sure. However, I feel that the American form will at least prove to be a good variety of the European, and it might be well later to adopt the name *pluviata*. The uncus in *Hydriomena autumnalis* is very peculiar, being forked while it is spatulate with a tendency to fork in *furcata* Thmb.

Hydriomena autumnalis, *trifasciata* or *pluviata* Gn., if our form proves distinct from the European, is more common in the Atlantic States than the Pacific. In Europe it seems to vary less in colour than here, though the bands are variable in width and the specimens in size. There is more tendency to melanism in the European specimens, but I have some from Saskatchewan, from Mr. A. J. Croker, that are as dark as those from Norway.

H. autumnalis Ström appears to be more common in Maine than Massachusetts, as my friend Mr. Frost took a very large number one day in a cedar swamp at Monmouth, and Mr. Emerton even took a specimen on the summit of Mt. Kataadn. In Europe it is said to feed on alder and willow, but the American food plant has not been recorded to my knowledge. The palpi of the European and American forms are all moderately long and do not vary. My kind friend, Mr. Chagnon, of Montreal, is working on the genitalia, and I hope to publish some notes on his results later. There is an excellent figure of *pluviata* or *autumnalis* in Packard's Monograph, Pl. VIII, fig. 29, which is typical of eastern specimens and of certain of the European specimens in markings, but not wholly in colour. The venation is shown in the Monograph, Pl. I, fig. 6.

Taking *autumnalis* as a whole, it is far less variable in markings than *furcata* or *quinquefasciata*, but is about the same in regard to colour variation. It is very easy to separate the species with moderate palpi, as there are fewer closely-allied forms, the only difficult one being *californiata* Pack., which is liable to be confounded with var. *perfracta* of *autumnalis*. Nearly all the collections I have seen contain *autumnalis*, so I do not think it can be rare in any particular locality in the North Atlantic States.

Var. (a) *perfracta* Swett (CAN. ENT., XLII, p. 279, 1910).

This looks like the normal *autumnalis*, only the mesial space is suffused with a deep pink and the course of the basal line is different. This variety was referred to without name by Guenée (Phal., Vol. 2, p. 398, 1505, 1857) under *pluviata*. It approaches superficially *H. californiata*, but I have pointed out the differences in the description. The variety seems to be very rare. It was taken in the Catskills by Mr. R. F. Pearsall. There are no other records of it to my knowledge.

Var. (b) *crokeri* Swett (CAN. ENT., XLII, p. 278, 1910).

This variety occurs in the Northwest, most commonly around Victoria. The green shadings of the typical form are replaced by yellow in the variety, and it has an intensely black median irregular band, instead of being of the usual slate colour. It is a very striking and distinct form; there is nothing approaching it among the European varieties.

Var. (c) *columbiata* Taylor (CAN. ENT., XXXVIII, p. 399, 1906).

I have a photograph of the type, kindly sent me by the Rev. G. W. Taylor for comparison, and it approaches the European var. *constricta* Strand very closely, but it lacks the cinereous ground colour, and I think it will remain in good standing. It may be known by the narrow mesial area, shaded with dark where the typical form species is white. The intradiscal band near the inner margin lacks the long-toothed projection of *crokeri*, and the hind wings are light ash with two bands beyond the discal spot. It is also distinguished by the larger size and greenish ground colour.

Var. (d) *constricta* Strand (Ent. Zeit., Gub. XIV, p. 61, 1906) also Berl. Ent. Zeit., Vol. 51, p. 254-257, 1906, and Ach. Naturv. Christiania, XXII, No. 5).

This is a peculiar cinereous form, in which the mesial white space is suffused with smutty striations, giving the whole a rather smoky appearance, approaching melanism. The blue irregular median band is very faint and the lines are all hardly discernible. The variety can best be separated by the dark narrow central space and dark hind wings with prominent discal spots and two extradiscal bands. I have examples from Norway, Germany and North America, the latter being represented by a ♂ and a ♀ from Forest Hills, Mass. (June 20, 1911), and Monmouth, Maine (June 25, 1903), which agree with the European specimens. I have

also seen it from Redvers, Sask., through Mr. Croker. It is not so rare in Europe as in North America, where I have only seen four examples. I have a specimen from England, through Mr. L. B. Prout, which approaches the variety, but it is more suffused and is almost unicolorous.

Var. (e) *nigrescens* Hoyningen-Heune (Berl. Ent. Zeit., 51, p. 254, 1906).

This variety is almost unicolorous, and has the white mesial space entirely suffused with cinereous, giving the wings a dusty appearance. The markings are very indistinct, and the whole insect has a smoky aspect. I have specimens from Berlin, Germany; Southport, England, and have seen a specimen from Redvers, Sask., through Mr. Croker.

These are all the varieties, so far, that have turned up, and are easily distinguished from the normal form by their colour. Walker described in 1860 (Cat. Brit. Mus., XXI, 489) *Boarmia divisaria*, which has been stated to be a synonym of *autumnalis* in Dyar's List, but the description does not seem to apply, and I doubt the reference. The type is in the D'Urban collection. Walker also described *renunciata* (Cat. Brit. Mus., XXIV, 1187, 1862), from Hudson Bay, and *frigidata* (Cat. Brit. Mus., XXVI, 1729, 1862), from Nova Scotia, which are synonyms of *autumnalis* in all probability, as Packard states in his notes on the North American Moths of the family Phalœnidæ in the British Museum (5th Rep. Peabody Acad., p. 88, 1873), that they are our common *pluviata*.

9. *Hydriomena transfigurata* Swett (CAN. ENT., XLIV, p. 195, 1912).

This is a pointed-wing species and closely resembles *irata* Swett in markings, though the antennæ of the latter will quickly separate it. It does not resemble *autumnalis* greatly, but I have generally found it mixed with the latter in collections. *H. transfigurata* can be readily separated by the time of appearance (early May), the tendency of intra- and extradiscal lines to unite near the inner margin, the dark hind wings and the distance of the extradiscal line from the outer margin in fore wings; also the faint median and marginal bands which are prominent in all other species. I should say this species is confined to the Atlantic States, and has occurred more commonly in the last two years than ever before. There is no form like it in Europe so far as I have seen, and it is not very common here, the only localities being Forest Hills and Cohasset, Mass., and New Brighton, Pa.

10. *Hydriomena californiata* Pack. (Proc. Bost. Soc. Nat. Hist., XIII, 396, 1871).

This was a very puzzling species to me for some time, until I received a specimen from Rev. G. W. Taylor like the one I had determined as *californiata*. We had both come to the same conclusion independently, and were the first, I believe, to determine *californiata* correctly. Packard did not understand *californiata* clearly, as he merged all sorts of forms under that name later, but the figure (pl. VIII, fig. 30) is excellent, and leaves no doubt as to the species. The type is not in the collection at Cambridge, and must have been returned to the sender by Packard; it was probably from Jas. Behrens. This species occurs in late July, and bears a slight resemblance to var. *perfracta* Swett, but is only found on the Pacific Coast to my knowledge.

11. — *Hydriomena lanavahrata* Strecker (Lep. Rhop. Het. Suppl., 2, 11, 1899).

According to Dr. Dyar, this is a variety of *californiata*, but I do not feel sure he knows *californiata* correctly, and until I can verify his assertion I think it better to let matters stand as they are. The locality would seem good for varieties, for the vicinity of Berkeley seems to be their Mecca. I have nothing in my collection that answers to the description, though Strecker does not give the essential points for differentiating *Hydriomenas*.

12. *Hydriomena glenwoodata* Swett (CAN. ENT., XLI, p. 231, 1909).

This is a peculiar, small, slender species with the slate-gray irregular line, s curved. The mesial space is somewhat suffused with dark atoms, and the whole insect is somewhat suffused with cinereous. It resembles slightly var. *nigrescens* of *autumnalis*. The palpi are very slender and a little longer than normal. I have never seen it from anywhere but the Rocky Mts., my type being from Pike's Peak, 8,000 to 10,000 ft. elevation.

13. *Hydriomena magnificata* Taylor (Ent. News, XVII, No. 6, 1906).

This resembles *speciosata* somewhat, differing in the moderate palpi. The description is clear, and the species cannot be confounded with any other.

This completes all the species and varieties known to date of the group with moderate palpi.

GROUP WITH MODERATE PALPI.

8. *Hyd. autumnalis* Ström { White mesial space, olive shadings,
or *pluviata* Gn. { slate-coloured bands.
- Var. (a) *perfracta* Swett. { (a) White mesial space suffused
with pink.
- Var. (b) *crokeri* Swett. { (b) Green ground colour replaced
with yellow, black bands.
- Var. (c) *columbiata* Taylor. { (c) As typical, mesial space suffused
with cinereous and narrow, very
large size.
- Var. (d) *constricta* Strand. { (d) Mesial lines smutty, lines in-
distinct.
- Var. (e) *nigrescens* Hoyn.-Heune. . . { (e) Unicolorous; smutty suffused.
9. *Hyd. transfigurata* Swett. { Green ground colour, tendency of
extra- and intradiscal lines to join
near inner margin.
10. *Hyd. californiata* Pack. { Red shadings to lines and mesial
space.
11. *Hyd. lanavahrata* Streck. { Said to be var. of *californiata*.
12. *Hyd. glenwoodata* Swett. { Long-winged slender species with
s-shaped intradiscal line.
13. *Hyd. magnificata* Taylor. { Black and green.

I wish to thank Mr. A. F. Winn and Mr. G. Chagnon for the loan of specimens, and the latter for his help on the genitalia, on which we hope to publish something later. I append a few of the more important references to *Hyd. autumnalis* and its varieties:

1783. *autumnalis* Ström, Kgl. dansk. Vid. Selsk. Skr., p. 85.
1776. " Dennis & Schiff, Syst. Verz. Wien, 109, 5 (not described).
1786. *autumnalis* Sepp., II, pl. 5, figs. 1-8.
1794. *trifasciata* Bork., Eur. Schmett., V, p. 308, No. 141.
1797. *impluviata* Hüb., Eur. Schmett., 223 (post 1797).
1810. " Haw., Lepid. Brit, part 2, p. 321.
1822. " Hüb., Verz. Schmett., 322, 3, p. 106.
1828. " Treits., Schmett. Europa, VI, part 2, p. 21.
1829. " Stephens, Nomenc. Brit. Ins., p. 44.
1830. " Dapon., Lep. France, V, p. 424, pl. 200, fig. 3.
1831. " Stephens, Ill. Brit. Haust., III, p. 254.

1839. *impluviata* Wood, Lep. Ins. of Great Brit., p. 610.
 1840. " Boisd., Index Method, 1767, p. 214.
 1847. " H.-S., Syst. Bearb. Schmett. Eur., III, p. 168,
 pl. 31, fig. 193.
 1850. *impluviata* Stephens, Cat. Brit. Lep., p. 195.
 1853. " La Harpe, Schmett., p. 295.
 1857. " Verz. Wien., p. 109, K. 5.
 1857. " Gn., Phal., II, p. 377, 1504.
 1857. *pluviata* Gn., Phal., II, p. 378, 1505.
 1860. (*divisaria*)? Walk., List Lep. Brit. Mus., XXI, p. 489.
 1862. *renunciata* Walk., List Lep. Brit. Mus., XXIV, p. 1187.
 1862. *impluviata* Walk., List Lep. Brit. Mus., XXIV, p. 1267.
 1862. *pluviata* Walk., List Lep. Brit. Mus., XXIV, p. 1268.
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BATS VS. MOSQUITOES.

We have received the following interesting letter from Dr L. O. Howard, Chief of the U. S. Bureau of Entomology, who has kindly given us permission to publish it:

STATE BOARD OF HEALTH OF FLORIDA

Jacksonville, Fla., June 26, 1912.

Dr. L. O. Howard, Chief of Bureau of Entomology, Washington, D. C.

Dear Doctor,—I thank you very much for your favour of the 24th. I had looked askant at the idea of bats reducing the number of mosquitoes

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appreciably. Some twenty years ago, perhaps longer, at Tavares, Fla., a development company undertook to build a winter resort. Tavares was at the time a small municipality with perhaps two or three hundred inhabitants located among the lakes in the southern part of the State.

Among the earlier efforts at developments an opera house was constructed, but owing to the freeze of 1895 it was never completed. The municipality never grew to amount to anything; in fact, I think the number of inhabitants now is what it was about then. The doors and windows of the lower floor of this opera house were securely fastened up to keep intruders out, but the upper windows were only closed by loose boards, which soon dropped out, making it easily accessible to bats. They took advantage of it and in the course of a few years were there in countless thousands. I know of no way of estimating the number, but you may get some idea of it from the fact that the only time I was ever there at the right hour was on a trip to Eustis. The train stopped at Tavares one half-hour before sunset, and remained there something like forty-five minutes. I took advantage of the occasion to see the bats emerge from the building. I had only been watching a few minutes when they began, first a single one, then two or three together, and as if the rustle started them, then they began seriously flying out of the window with incredible swiftness. There must have been at least half a hundred a second. I watched this stream of bats pouring out for half an hour or so, and was told by some of the residents of Tavares that it would continue until something like half an hour after dark, making probably two hours altogether.

It was on this trip, now seven years ago, that I was making some mosquito observations, and I have to confess that I have never seen more mosquitoes in the interior of the State, than I saw at that time.

Some two years ago the opera house in question was cleaned out and converted into a packing house. I have since made inquiry of the citizens in the vicinity of Tavares and Eustis, as to whether they have experienced any appreciable difference in the number of mosquitoes now, and when the bat roost was at its height, and am convinced that the difference, to say the least, is not such as to cause one to notice it.

Again thanking you for your information, I am, very truly and cordially yours,

(Signed)

HIRAM BYRD.

SOME NEW SPECIES OF DELPHACIDÆ *

BY C. S. SPOONER, GEORGIA STATE BOARD OF ENTOMOLOGY.

The following species were, with one exception, taken by the author during the past five years. In the genus *Pissonotus* they form a very considerable addition to the list of our species.

My thanks are due to Professor A. D. MacGillivray of the University of Illinois for going over the manuscript and for valuable help and suggestions. I also wish to thank Professor J. Chester Bradley of Cornell University for the loan and exchange of specimens and Mr. C. P. Alexander also of Cornell University, for the gift of specimens of several desirable species.

The author has planned an extensive study of the Delphacidæ and would be grateful for the loan or exchange of material. He will gladly name specimens for the privilege of retaining desirable duplicates.

Pissonotus guttatus, n. sp.

Brachypterous ♀.—Eyes oval, deeply indented below to receive the antennæ, colour grey; vertex considerably longer than wide, slightly rounded in front, projecting slightly before the eyes; carinæ of the vertex all present, rather indistinct; vertex uniformly black except the caudo-lateral angles which are slightly yellowish. Carinæ meeting on the front just below the curve of the vertex, extending distinctly from this point throughout the length of the front, indistinct on the vertex; front considerably constricted between the eyes, deep pitchy black above, becoming gradually lighter until it is white at the base; clypeo-frontal suture curved, the clypeus deep uniform black with the median carina distinct; the black colour of the clypeus extends as a band across the anterior coxæ as is characteristic of the genus.

The second segment of the antennæ about one-fourth as long again as the first, with a few protuberances; antennæ uniform pale honey-yellow.

The length of the prothorax from the anterior to the caudal margins about equal to that of the vertex; caudal margin slightly concave, carinæ distinct; anterior portion deep, shiny black; narrow band on posterior margin dirty white.

Legs normal, pale honey-yellow except tips of the tarsi which are black and two slender brown lines on the outer sides of the tibiæ.

*Published with the permission of E. L. Wersham, State Entomologist of Georgia.

August, 1912.

Scutellum triangular, sides very slightly arcuate ; median carina distinct ; lateral carina inconspicuous, reaching the posterior margin ; colour uniform honey-yellow.

Elytra short, extending to the middle of the first abdominal segment, coriaceous, highly polished, veins almost obliterated ; colour pale honey-yellow with an oval blotch of white in the centre of the apical margin ; abdomen honey-yellow but slightly darker than the scutellum and elytra.

Genitalia uniform honey-yellow, paler than the tergum ; pygofer tapering to a rounded point ; plates extending about one-third the length of the pygofer ; anal style white. Length 3.5 mm.

Described from a single female taken at Ithaca, N. Y., Aug. 1st, 1896. Type in collection of Cornell University.

Very close to *P. delicatus* Van Duzee but easily separable from it by the black front, vertex and prothorax. The prothorax lacks the foveæ so conspicuous in *delicatus* and the shape of the front is quite different.

Pissonotus foveatus n. sp.

Brachypterous ♀.—A fairly large species, form long, oval. Vertex slightly rounded in front ; eyes oval, deeply indented below to receive the antennæ ; colour gray, irregularly mottled with black ; vertex slightly longer than wide, slightly wider behind the eyes than before ; fully carinated ; carinæ sharp, except the posterior median, which tends to fade out posteriorly ; the anterior median carina forked just below the apex of the head ; colour of the vertex yellowish white, with a pair of dark brown foveæ just posterior to the forking of the anterior median carina, one on either side of the carina, and another pair similarly situated, but slightly farther caudad ; there is a yellowish fovea located in each posterior lateral angle of the vertex.

Front with sides slightly convex ; median carina sharp throughout ; colour yellowish white marked with brown. These markings vary somewhat, but may in general be described as follows : According to colour, the front may be divided into four regions ; first, just under the vertex a darker area in which may be found two deep brown lines extending across the median carina ; these lines extend to the edge of the front ; the second area is light, and the only markings on it are a pair of brown dots on each side at the outer margin ; this pale area is about equal in width to the first area. Covering about two-thirds of the remainder of the front is the third area, dark and marked like the first area, except that it is darker and less distinctly marked ; in some specimens it is scarcely more than a

dark brown band. The remainder of the front, comprising the fourth area, is yellowish white devoid of markings.

Clypeus uniformly black, with the median carina distinct; the black colour extending in a band across the anterior coxæ as is typical of the genus.

Second segment of the antennæ about one-fourth as long again as the basal segment; basal segment and basal half of the second segment yellowish white; distal half of the second segment deep brown.

Prothorax shorter than head, caudal edge concave; the carinæ distinct; a fovea on each side of the median carina, midway to the lateral carinæ and slightly nearer the cephalic than the caudal margin; colour yellowish white, with varied dark brown spots and blotches on the caudal margin; legs yellowish, with a brown band across the proximal portion of the tibiæ.

Scutellum triangular, sides very distinctly arcuate, carinæ distinct, the lateral carinæ extending to the caudal margin; a brownish fovea on each side of each lateral carina, about midway between the cephalic and caudal margins; colour yellowish brown.

Elytra short, extending slightly beyond the middle of the second abdominal segment, coriaceous, polished, veins indistinct; colour greyish white, irregularly spotted with brown.

First, second and third abdominal segments with the dorsum yellowish brown, with a few brown dots; fourth, fifth and sixth segments with their median portions yellowish brown and their lateral portions deep brown.

Genitalia reddish-brown, pygofer tapering to a blunt point, plates extending about one-third the length of the pygofer, light yellow, tip of the ovipositor much lighter brown, style yellow. Length, 3.25 mm.

Brachypterous ♂.—Smaller; form and markings about as in female, with not quite so much brown.

Genitalia, opening of the pygofer rather narrow, oval; superior wall of the anal tube prolonged into two incurving tusks, the points of which rest upon two large pointed projections extending inward from the inferior wall of the pygofer; colour yellow, except the ends of the tusks and the points of the projections, which are reddish brown. Length, 2.5 mm.

This species was taken quite abundantly on a species of *Compositæ* by the author at Corpus Christi, Texas. Types, taken May 19, 1907, in the author's collection.

Pissonotus variegatus, n. sp.

Macropterous ♀.—Form and size of *P. pallipes*. Head rounded in

front; eyes large and oval, slightly indented below to receive the antennæ; colour yellowish around the edge, black in the centre; vertex about one-third again as long as broad, projecting slightly beyond the eyes, quite strongly rounded in front, in which it differs from *pallipes* where it is nearly straight; the posterior carina wanting, other carinæ sharp and distinct; colour light yellow, except outside the anterior median carinæ, where it is marked by two brown dots on each side.

Front slightly wider below the eyes than between them; median carina distinct throughout the length of the front, forked just below the vertex; colour, anterior two-thirds yellow, much mottled with brown, posterior third pure light yellow; clypeus uniformly black, with the median carina distinct, the black band continuing across the anterior coxæ.

First and second antennal segments subequal, proximal segment and proximal half of the second segment yellow, distal half of the second segment reddish brown, roughened by numerous protuberences.

Prothorax equal in depth to the head, posterior edge concave, almost angled at the centre; carinæ all distinct, lateral ones reaching caudal margin of the prothorax, quite widely divergent; colour brown, marked with yellow, especially in the centre; legs yellow, with a brown band around the distal end of the femora and proximal end of the tibiæ; tips of the tarsi black.

Scutellum triangular with the sides very much arcuate, apex rounded, scutellum about twice as deep as the prothorax; carinæ distinct, reaching to the caudal margin; colour brown with yellow markings. One-fourth of the elytra extending beyond the tip of the abdomen; milky in colour with brown dots along the veins. Genitalia dark brown; pygofers bluntly pointed, plates dark yellow, extending over one-third the length of the pygofers, very much curved; style white. Length, including elytra, 3.5 mm.

Described from a single female taken by the author at Corpus Christi, Texas, June 19, 1907. Type in the author's collection.

Pissonotus divaricatus, n. sp.

Macropterous ♀.—Form and general appearance of *P. basalis*, although not quite so large and heavy an insect; eyes oval, not deeply emarginate below to receive the antennæ.

Vertex a little longer than wide, sides nearly straight, very slightly wider in front of the eyes than behind them; all the carinæ distinct, posterior

foveæ fairly deep ; colour reddish brown with the carinæ and margins light yellowish brown.

Front about twice as long as wide, sides very slightly arcuate, widest a little below the eyes ; clypeo-frontal suture slightly curved, median carina distinct, forked just below the apex of the head ; colour uniform reddish brown except a narrow strip along the clypeo-frontal suture, which is light yellow.

Clypeus uniformly black with the median carina fairly distinct.

Second segment of the antennæ a little more than twice as long as the first segment, second segment roughened by tubercles, proximal segment black, second segment yellowish brown.

Prothorax not quite so deep as the vertex, carinæ distinct, the lateral carinæ quite widely divergent, fading out just before the posterior margin, posterior margin distinctly concave ; colour reddish brown, except the narrow posterior edge, which is almost white.

Coxæ light yellow ; femora and most of the tibiæ reddish brown, tips of the tibiæ and the first two tarsal segments very light yellow, last tarsal segment dark brown, spur almost white with large, prominent, black serrations.

Scutellum almost twice as deep as the prothorax, sides very decidedly arcuate, tip a rounded point, carinæ all distinct, lateral carinæ reaching the posterior margin of the scutellum and curving outward ; colour dark brown, except the tip, which is light yellow, almost white.

Elytra extending one-third their length beyond the tip of the abdomen, veins brown, membrane smoky ; abdomen uniformly dark brown.

Genitalia : Pygofer ending in a blunt point, reddish brown, ovipositor reddish brown at the tip, lighter at the base, plates dark within, lighter on the free edge, apex very gradually curved, extending about one-third the length of the pygofer, style light yellow. Length, including elytra, 3 mm.

Macropterous ♂.—Same form, size and general characters as the female. Genitalia : Opening of the pygofer broad oval, superior wall of anal tube prolonged into long, incurving, tusk-like horns, the points resting in indentations of the inferior wall of pygofer, styles large hook like organs with the hooks pointing outward ; colour dark reddish brown.

Described from a pair taken by the author at Middletown, N. Y., July 12, 1910. Two females of this species were taken at the same locality on July 11 and 18, 1910. Types in the author's collection.

Pissonotus piceus, n. sp.

Brachypterous ♀.—A small species slightly smaller than *P. brunneus* and not so stout. Head short, very slightly curved in front. Eyes slightly indented below to receive the antennæ; colour light gray around margins, black in the centre; vertex about as deep as wide in front, sides curving between the eyes, narrower behind the eyes than before; all the carinæ present, but all rather weak, foveæ not very deep; colour deep shiny black.

Front rather wide and short, sides nearly straight. median carina very faint; anterior three-fourths deep shiny black, posterior one-fourth pure white.

Clypeus uniformly black; median carina but a mere suggestion; the black band carried across the anterior coxæ as usual; posterior of this a band of white and towards the tip of the abdomen, black.

Basal segment of the antennæ about one-third as long as the second segment; basal segment brown, second segment honey-yellow spotted with white, tuberculate.

Prothorax about as deep as the head, posterior margin very slightly concave, median carina practically indistinguishable, lateral carinæ distinct for about two-thirds of their length and then fading out; colour pure white.

First and second pairs of legs with the coxæ light brown, shading through black on the femora and tibiæ to white on the first two tarsal segments, the last tarsal segment black, tibiæ of the first and second pairs of legs foliaceous; third pair of legs shading from dark brown at the base of the femora to honey-yellow on the tibiæ to white on the tarsi, tips of the tarsi black.

Scutellum triangular, sides straight, not visible for its entire breadth, covered by the prothorax on its outer edges; median carina indistinct, lateral carinæ short, curved outward, poorly defined; colour uniform deep shiny black.

Elytra short, not quite covering the first abdominal segment, coriaceous, polished, veins indistinct; colour, basal three-fourths deep shiny black, posterior one-fourth pure white.

Abdomen uniform shiny black; genitalia deep reddish brown, almost black; pygofer tapering to a blunt point, plates very short, extending only one-fourth of the length of the pygofer, only a small edge visible; style white. Length, 2.5 mm.

A very pretty and delicate insect. The foliaceus tibiæ recall *Phyllodinus*, but the carinæ of the prothorax are straight and the other characters agree with *Pissonotus*; it may deserve to be placed in a new genus, but for the present I prefer to place it in *Pissonotus*. The species is very easily identified by the white thorax and white margin of the elytra and by the deep shiny black of the rest of the body. Described from a specimen taken by the author at Middletown, N. Y., July 11, 1910. Two other specimens were taken at the same locality July 18 and 21, 1910. Type in the author's collection.

Pissonotus binotatus, n. sp.

Brachypterous ♀.—Form and general appearance of *P. marginatus*, but considerably smaller.

Eyes oval, deeply indented below to receive the antennæ; colour dark gray, almost black, with a yellow margin; vertex about as long as wide, very slightly produced before the eyes, anterior margin slightly curved; carinæ all present, very pronounced, posterior foveæ very deep; colour uniform dark reddish brown.

Front about one and one-third times as long as broad, widest below the eyes, sides slightly arcuate; clypeo-frontal suture straight, median and lateral carinæ quite prominent, median carina forked just below the apex of the head; colour uniform reddish brown, except a very narrow band along the clypeo-frontal suture, which is light yellow.

Clypeus of the form of a truncated triangle; median carina fairly prominent; colour black, the black band extending across the anterior coxæ.

Basal segment of the antennæ a little less than one-half the length of the second; the second segment lacks the protuberences so often found; basal segment reddish brown, second segment light yellow.

Prothorax a little deeper than the head, caudal margin almost straight, very slightly emarginate on the sides and a suggestion of an emargination in the centre; median carina very prominent, lateral carinæ strong on proximal two-thirds of the prothorax, fading out before reaching the posterior margin; colour uniform reddish brown.

Anterior legs yellow, lineated with brown; second and third pairs of legs with yellow coxæ, femora and proximal half of tibiæ brown, the tibiæ becoming gradually lighter in colour toward the distal end, the distal end of the tibiæ and first two tarsal segments light yellow, almost white; last tarsal segment dark brown; tarsal spur rather small, light yellow, almost white.

Scutellum triangular, about one and one-third times as deep as the prothorax, sides straight, median and lateral carinæ prominent, the latter attaining the posterior margin; colour uniform reddish brown.

Elytra short, practically covering the first abdominal segment, highly polished, veins indistinct; colour reddish brown, with two yellowish white dots on the apical margin of each elytron.

Abdomen uniformly reddish brown, a prominent carina extending along the middle of each tergum; genitalia reddish brown, pygofer ending in rather a sharp point; plates short, extending only one-third the length of the pygofer, a little lighter in colour; style white. Length, 2 mm.

Brachypterous ♂.—Form and markings the same as that of the female, considerably smaller in size. Genitalia, aperture of the pygofer quite long and narrow, superior wall of the anal tube produced in long outcurving horns, these rest on projecting points of the ventral margins of the pygofer; styles small; anal style light yellow, rest of the genitalia dark reddish brown. Length, 1.5 mm.

This species resembles *P. marginatus* quite closely. It is a much smaller species, there are distinct differences in the proportions of the front and antennæ, the spur is smaller proportionally. There are also differences in the genitalia and some noticeable colour differences. *P. binotatus* lacks the white on the prothorax, the front is much darker, and has two white spots on the apical margin of the elytra instead of a full white band as in *marginatus*.

Type of the male and female taken at De Witt, Mitchell Co., Ga., April 6, 1912, by the author. Types in the author's collection.

Liburnia dolera, n. sp.

Macropterous ♂.—A medium-sized form for this genus. Eyes oval, deeply and narrowly indented below to receive the antennæ; colour gray, darker in the centre. Vertex slightly longer than wide, projecting a little beyond the eyes, carinæ distinct, except the posterior median, which is quite faint; foveæ deep; colour dark reddish brown.

Front widest a little below the eyes, constricted considerably between the eyes, sides curved, the median and lateral carinæ sharp and prominent, the former forked at the vertex; clypeo-frontal suture slightly curved; colour reddish brown, with the ventral portions of the lateral carinæ dark yellow. Clypeus a lighter brown than the front, the carina distinct.

Basal segment of the antennæ one-third the length of the second segment, dark brown; second segment rather thick, tubercled; light yellow in colour.

Prothorax a very little deeper than the vertex ; hind margin concave, almost angled at the centre ; carinæ very distinct ; colour uniform shiny reddish brown.

Legs brown, becoming lighter toward the distal end of the tibiæ ; the tarsi yellow ; spur wide at base and very finely serrate.

Scutellum triangular, about twice as deep as the prothorax, sides arcuate, apex a rather sharp point, carinæ distinct, the lateral carinæ attaining the posterior margin, the median carina is obsolete toward the apex ; colour shiny, reddish brown, with the margins and apex yellow.

Elytra nearly twice as long as the abdomen ; colour smoky brown, veins darker brown with dark dots along them.

Tergum of the first two abdominal segments yellow, remainder of the abdomen reddish brown. Genitalia, aperture of the pygofer large, oval, wider than long ; ventral edge of the pygofer deeply notched, styles large, broad, divergent from their base, following the curve of the pygofer to the anal tube, a few long setæ at their apical end. Length, including elytra, 3.5 mm.

Taken on reeds by the author in Renwick Swamp, Ithaca, N. Y., July 20, 1908. Five specimens are before me, one of these shows much more yellow on the vertex and front. Type in the author's collection.

This species suggests the macropterous form of *L. lineatipes* Van Duzee, but the colouring is different and, besides other minor differences, the genitalia are decidedly unlike that species.

Achorotile foveata, n. sp.

Macropterous ♀.—Eyes oval, deeply emarginate below to receive the antennæ ; colour gray. Vertex as wide as long, rounded before, extending a little beyond the eyes ; carinæ distinct, except the posterior median, which is weak ; posterior foveæ deep ; colour yellowish brown, lighter posteriorly.

Front twice as long as wide, widest near the middle, sides gently curving ; clypeo-frontal suture straight ; the median carinæ curved, following the curve of the sides to the front ; just outside of each median carina there is a row of pustules, six on each side, three near the vertex and three near the clypeus ; between these two groups are two pustules on each side along the outer margin of the front ; colour deep reddish brown.

Clypeus shiny black with an indistinct carina. Second segment of the antennæ about one and one-third times as long as the first, covered with pustules ; basal segment reddish brown, second segment yellowish brown.

Prothorax two-thirds as deep as the vertex; lateral carinae distinct, following the curve of the eye; behind each carina a row of seven pustules; median carina faint, a puncture on each side of it about the middle of the prothorax; posterior margin quite deeply concave; colour deep reddish brown.

Legs yellow lineated with brown; tarsal claws black; spur triangular, finely toothed. Scutellum a little more than twice as deep as the prothorax; triangular, sides strongly arcuate, terminating in a rather sharp point; two pustules on each side near the middle of the lateral margin; median carina distinct, lateral carinae rather faint, divergent; colour polished black with yellowish tip.

Elytra extending one-third of their length beyond the abdomen; veins brown, membrane slightly smoky.

Abdomen black, except the dorsum of the first two segments, which is yellowish; along the lateral margins of the dorsum of each segment is a transverse row of four pustules.

Genitalia: pygofers tapering to a blunt point, dark reddish brown; plates about one third as long as the pygofers, only a narrow edge showing, light brown in colour; ovipositor and anal tube dark honey-yellow.

Length, including elytra, 3.5 mm.

Described from a female taken by Professor J. Chester Bradley at Felton, Santa Cruz Mts., California, May 17, 1907. Type in the collection of Cornell University.

This species may be readily told from *A. albosignata* by the deeper vertex, the different coloration, and by the presence of four instead of two pustules on each side of the abdominal segments.

THE NORTH AMERICAN ÆSHNID DRAGON-FLIES.

At the present time, when the air is full of nomenclatural discussion, when there are many entomologists who are devoting themselves almost exclusively to naming and classifying insects from dried skins, "systematists" they are called, and we often seek in vain for the system, it is as refreshing as a woodland brook to a tired traveller to read a monograph of the nature of Dr. Walker's "North American Dragon-flies of the genus *Æshna*."* Here we have a systematic study of a group in which the

*University of Toronto Studies, Biological Series, No. 11, VIII, 213 pp., 28 plates (6 coloured). Publ. by the Librarian, University of Toronto Library, 1912. \$2.00.

August, 1912.

life-histories, ecology and seasonal and geographical distribution have been given the attention which they merit and which is necessary for a sound basis of classification. A classification which is not based on morphological characters considered in relation to and together with biological data must of necessity be incomplete. One thing is certain, that only further study of the bionomics of insects will settle the disputes of the "lumpers" and "splitters," to use colloquial but expressive definitions. The present monograph is an admirable illustration of this fact, and were this the only outstanding feature of this most thorough piece of work, the author would deserve the thanks of his entomological confreres. But his complete treatment of what he rightly characterizes as a "neglected group" of insects renders the volume additionally welcome both to entomologists and to those interested in zoögeography,

The monograph may be roughly divided into three sections, namely, taxonomic, bionomic and systematic. Perhaps the most important feature of the section on the taxonomy of the group is the fact that the author calls attention to the necessity of a study not only of a large series but of the colour pattern. The exclusive reliance upon structural features and the neglect to take into consideration the colour pattern has resulted in a "lumping" of species which a study of the natural colours does not support. A very careful study of colour patterns has therefore been made, and the six excellent coloured plates illustrating the same make this section of the work invaluable to the Odonatist.

Perhaps the most interesting, and, to the writer's mind, certainly the most important part of the bionomic section, is that dealing with variation and geographical segregation. If more than a brief reference were attempted here this review would exceed the appointed limits. In this section the author has, as it were, struck a rich metalliferous vein, and we are eager to follow it; it is too rich and promising to be left, and we hope it will be followed up by further investigation. It is found that there occur in the females varieties in colour, in the length of the apparently functionless abdominal appendages and in the depth of the third abdominal segment and further, that there is a distinct correlation between the variations of the last two structures. These variations are dependent to a large extent upon locality, and hence, possibly upon climatic conditions. Here then is an unrivalled field awaiting the attention of the biometrician. Important observations have been made by the author upon the life-history, and his work is made increasingly valuable by the excellent

illustrations, especially of the acts of oviposition, copulation and emergence of the adult.

The North American species of *Æshna* appear to resolve themselves into six groups, and about two-thirds of the monograph is devoted to very full and orderly descriptions of the twenty species and geographical subspecies found in North America. As an example of monographic treatment, this volume would be difficult to surpass, both in its broad and thorough character and in the unusual excellence of the author's numerous illustrations.

In congratulating the Editor of our journal on the production of so useful and excellent a monograph, which will bring great credit to Canadian entomology, we should also like to express our great indebtedness to the author's father, Sir Edmund Walker, for his generosity in rendering possible the illustration of the monograph by so excellent and large a series of plates, and which has enabled justice to be done to the exceptionally well-drawn figures.

C. GORDON HEWITT.

A NEW PAPILIO FROM CENTRAL AMERICA.

BY GEORGE A. EHRLMANN, PITTSBURG, PA.

Papilio chromealus, sp. n.

Closely allied to *P. copanæ* Reakert. Upper side of all the wings with a golden sheen (bluish-green in *P. copanæ*); submarginal arrow-shaped spots of the fore-wings orange instead of yellow. On the upper side of the hind wings the submarginal row of spots is identical with that of *P. copanæ* except in colour, the costal spot between nervules 1 and 2 being pale buff, the other four spots between nervules 2 and 5b deep orange chrome. The spot between nervules 5b and 5c is pure white. The spot between nervules 5c and 6 is the last spot and is also deep orange chrome.

The colour and all the markings of the underside are the same as in *P. copanæ*.

Habitat.—Honduras, Central America.

This fine *Papilio* was collected near the base of the Congrehoy Peak in the Province of Yoro by the late Dr. Carl Thime and sent to me with several thousand other Lepidoptera from various localities in Honduras.

P. chromealus is a very conspicuous *Papilio* and if not a distinct species it is assuredly a beautiful variation of *P. copanæ* Reakert, from Guatemala.

August, 1912.

NEW SPECIES OF COLEOPTERA OF THE GENUS AGRILUS.

BY C. A. FROST, SOUTH FRAMINGHAM, MASS.

For several years considerable study has been given the specimens of this genus and some of the more important results are here presented :

Agrilus champlaini, new species. *Holotype* a male. Form of *muticus*, robust, colour black with a purplish tint, subopaque. *Antennæ* reaching the middle of the prothorax, serrate from the fourth joint, bronzed ; *head* densely coarsely punctured, strigate above and pubescent below the middle, occiput somewhat concaved, the median impressed line extending to the middle of the front, eyes dark. *Prothorax* one-fourth wider than long, widest at the middle, one-fourth wider at the base than at the apex, sides regularly arcuate, hind angles obtuse with a rather strong carina, lateral margin sinuous, two discal foveæ in front of the middle, basal depression distinct, lateral faint ; surface transversely rugose, becoming confused and finer at the sides and anterior angles. *Scutellum* not carinate, notched. *Elytra* nearly parallel to the apical seventh, tips separately and broadly rounded with coarse unequal serrations, disc slightly flattened with a vague costa, suture elevated behind the middle, surface rather coarsely irregularly granulate-imbricate, finer in the basal depressions which are moderately deep. *Body* beneath more shining, bronzed, with purplish reflections especially along the sides and apex of the abdomen ; *prosternal* lobe sinuate-truncate, intercoxal process broad, acute at tip, surface roughly densely punctate, propleuræ granulate ; *metasternum* rather closely granulate becoming subasperate posteriorly like the coxal plates ; *abdomen* finely punctate, sparsely along the middle, more closely along the sides, resembling imbricated scales on the first segment and with undulating lines connecting the punctures on the others ; *pygidium* coarsely punctate with a strong projecting carina. First abdominal segment flat or slightly concave, second with smooth groove extending nearly to the posterior suture, last ventral eroded-truncate at the tip, vertical portion of abdomen granulate, inferior margin serrate, apex smooth and truncate. Front and middle tibiæ mucronate ; *claws* similar on all feet, cleft with the inner parts broad and curving inward, the apices nearly touching.

Length 8 mm. Width at base of elytra 2.3 mm.

The females at hand have the front less pubescent and more concave, granulations of the eye more distinct, sides of the prothorax more arcuate, being widest in front of the middle, discal depressions more pronounced and with the intervals between the strigæ more distinctly

punctate, surface of the elytra more finely and regularly imbricate; the abdomen is smoother and more shining bronze, with the first ventral slightly flattened; the claws are alike on all the feet, the inner portion quite broad and curving inward slightly, leaving a much wider space between the apices than in the male.

The pubescence of this species is not at all evident except on the post-clypeal area, the anterior angles of the prothorax, and the apices of the elytra. The sexes do not vary much in this respect, but I suspect that my males do not show the normal elytral pubescence; possibly it is discoloured. On the under side of the body the vestiture is short and sparse, giving a silver tint to the abdomen; it becomes more dense on the prosternum of the males.

This species would naturally be placed next to *angelicus* in Dr Horn's table (Trans. Am. Ent. Soc., XVIII, p. 283). Through the kindness of Mr. H. C. Fall, of Pasadena, Cal., I have been enabled to examine a specimen of *angelicus*, and can say that it does not resemble the present species in colour, form or punctuation. *Champlaini* might be confused with *anxius* and allies, but the darker colour, more robust and shorter form, sculpture, and structure of the claws should at once distinguish it.

This species is represented by three specimens (emerged May 29, 1911), two females and one male, all bred from the twigs of the horn-beam, *Ostrya virginica*, by Mr. Alfred B. Champlain, at New Haven, Connecticut. The specimens and two of the galls were sent to me by Dr. W. E. Britton from the State Agricultural Experimental Station in that city. It is through the kindness of these two gentlemen that the above description has been made. The galls were collected at Lyme, Conn., April 30, 1911.

The gall is in each case about one inch in length, fusiform, expanding to a diameter of 12 millimeters in the middle, and on branches of about six millimeters in diameter. One of the galls was split open and the bark removed from one side, so that the course of the larva was shown to be a spiral from the point of entrance toward the end of the twig. It circled the twig in four distinct courses, each one increasing in diameter about one-half the previous one and leaving a ridge between them. They are tightly packed with debris and are wholly in the wood, leaving the bark intact. On the fourth spiral the gallery leads directly to the heart of the branch, from whence it is hollowed out in an arcuate course downward until it intersects the bark in an oblong exit very near the point of entrance. The exit in the two specimens at hand measures three by two millimeters, the long diameter being transverse to the twig.

Since the above was written a male specimen has been received from Mr. H. B. Kirk, which was taken at Harrisburg, Pa., June 16, 1911. It differs slightly from the Connecticut male in the following particular: The front is more concave, the two discal foveæ of the prothorax are very indistinct, the prosternal lobe is distinctly emarginate in front, the scutellum is not notched, and the form is slightly more cuneate; with the elytral tips normally serrate.

The *holotype* and *allotype* are in my collection, and the remaining female *paratype* is in the collection of the Connecticut Agricultural Experimental Station.

A. cratagi, new species.—*Holotype* a male. Form of *obsoletoguttatus*, elongate. *Colour* olive-æneous, suffused with cupreous on apical third, varying to entirely cupreo-æneous, shining. *Antennæ* reaching the middle of the prothorax, serrate from the fourth joint, æneous. *Head* slightly flattened, greenish, granulate-punctate, more closely in a post-clypeal pubescent area, smooth spaces near the eyes finely alutaceous; occiput impressed, punctures tending to form strigæ posteriorly; median line extending to the middle of the front, where it ends in a slight depression. *Prothorax* one-fourth wider than long, varying in the specimens at hand from sides nearly parallel to regularly arcuate, hind angles rectangular, with a strong, nearly straight carina extending almost half the length of the prothorax, lateral margin slightly sinuate; disk with an anterior circular depression and a posterior oblong one, lateral oblique depressions moderate; surface transversely strigate with punctures between the strigæ. *Scutellum* transversely carinate. *Elytra* slightly sinuate behind the humeri and faintly dilated behind the middle, apices separately rounded and serrulate, disk slightly flattened, with the faintest indication of a costa, basal depressions rather slight, surface imbricate in very regular transverse series, gradually becoming finer toward the apex, pubescence very indistinct, visible only in the basal depression of the elytra and the anterior angles of the prothorax. *Body* beneath shining æneous with a faint cupreous tinge; prosternal lobe distinctly emarginate, granulate-punctate, with a thick mat of erect brownish hair extending from the anterior margin down the intercoxal process to the acute tip, and covering a small patch between the meso-coxæ; propleuræ and sides of metasternum granulate-imbricate, sparsely pubescent; metasternum smoother at middle. *Abdomen* imbricate on the first ventral, finely imbricate and sparsely punctate on the others; first ventral with a small patch of brownish hair on the

intercoxal process, last ventral oval and eroded at tip ; inferior margin of the vertical portion of the abdomen serrulate. *Pygidium* with an evident carina, not projecting, coarsely sparsely punctured. *Claws* similar on all the feet in both sexes, nearly bifid. Length 6 to 8 mm. Width 1.5 to 2.3 mm.

The females at hand differ as follows : Head cupreous or æneus, more concaved along the median line, more coarsely sparsely sculptured, an opaque depressed area above the clypeal carina ; sides of prothorax slightly more arcuate ; beneath sparsely pubescent, no erect brownish hair.

The two extremes in size, as given in the above description, are both females ; the other specimens average 6.5 mm. in length.

A pair of this species first came to me from Mr. A. B. Champlain, with the label, "Chinchilla, Pa., VII, 2." The past year Mr. H. B. Kirk sent me four male and two females bred from the dead fallen trunk of *Cratægus*, which was also infested with *Xylotrechus colonus* and *Neoclytus luscus*. The material was collected by Mr. W. S. Fisher, of Highspire, Pa., and Mr. Kirk, at Harrisburg, Pa., March 11, 1911, and the specimens are labelled "Emerged IV, 6-11."

This species should be placed between *politus* and *fallax* in Horn's table, but it resembles neither of them so much as *obsoletoguttatus* in size and shape. From the two latter it can at once be distinguished by the lack of pubescent spots on the elytra, and the structure of the claws. It resembles the narrower forms of *politus* somewhat, but the hairy prosternum will at once separate the males, and the claws, form of prothorax, broader head, and the more parallel form will be sufficient to distinguish either sex in a series of *politus*.

The distribution of the types is as follows : *Holotype*, *allotype* and two *paratypes* in my collection, a male and female *paratype* in the collection of Mr. H. B. Kirk, a male *paratype* in the collection of Mr. W. S. Fisher, and a male *paratype* in the collection of Mr. Chas. Liebeck, to whom I am much indebted for comparing many specimens with the Horn types.

A. cephalicus Lec.—Original description (Trans. Am. Phil. Soc., XI, p. 249). Obscurus, ænescens, capite cupreo, haud pubescente fortiter haud confluentur punctato, sat profunde canaliculato, thorace latitudine haud brevior, dorso canaliculato et biimpresso, lateribus subrectis fortiter impressis, basi bifoveato, angulis posticis oblique carinatis, elytris sat fortiter dense granulatis, subunicostatis, apice subserratis rotundatis. Long, .18-.25. Locality : "Middle States and Lake Superior."

The above species was suppressed as a synonym of *egenus* by Dr. Horn in his monograph without explanation or remarks, and it seems to be entirely unwarranted. In making an examination of the *egenus* series in the Le Conte collection at Cambridge, I was much surprised to find that the specimen bearing the label "*A. cephalicus* Lec." (and also "*egenus* No. 11") belonged to a different group, having the antennæ serrate from the fourth joint. Numbers 3, 5 and 16 were also this species, and there were seven specimens having the fourth joint serrate and the inner lobe of the claws incurved; these are probably *otiosus*. The type of *puncticeps* Lec., which has the fourth joint serrate, is placed as No. 13 in the *egenus* series. This was also made a synonym of *egenus* by Dr. Horn. The exact standing of *puncticeps* is at present doubtful; I was inclined to place it in the *otiosus* group, although I was unable to see the claws of the middle tarsi, which were the only ones intact; but since reading Le Conte's synopsis, in which he places it in the group with the inner lobe of the claws contiguous, I consider it to be a valid species. If it should prove to be identical with *cephalicus*, the name *puncticeps* will have priority.

The Le Conte specimen bearing the label *cephalicus* is a female, and I have prepared the following re-description from five males from Highspire, Pa., June 12 to 20, 1909, and June 14, 1910, all collected by Mr. W. S. Fisher, of that place. He also sent me two males from Jeanette, Pa.

A. cephalicus Lec. Re-description: Form of *otiosus*; colour æneous-olive. *Antennæ* moderate, bluish æneous, serrate from the fourth joint, second and third joints with rather long pubescence on the under side. *Head* convex, bluish, median line varying from distinctly to faintly impressed, and extending to a post-clypeal pubescent area, sparsely punctate, finely alutaceous, strigate on the occiput. *Prothorax* a little wider than long, narrowed at the base, sides feebly arcuate, lateral margin nearly straight, hind angles with a well defined carina, disk convex, subequally bi-impressed on the median line, an oblique lateral depression; surface transversely strigate, strigæ becoming confused anteriorly. *Scutellum* transversely carinate. *Elytra* subparallel, narrowed at the apical third to the rounded serrulate apices; disk flattened, faintly costate; surface densely imbricate, basal impressions moderate. *Body* beneath bluish varying to greenish æneous. *Prosternal* lobe distinctly emarginate and covered with an erect grayish pubescence, or hair, that extends to near the middle of the first ventral segment; it is shorter and less noticeable on the metasternum; tip of the intercoxal process of pros-

ternum acute; propleuræ and coxal plates subgranulate, sparsely pubescent; metasternum scabrous-imbricate; ventrals imbricate, becoming finer toward the apex and sparsely punctate along the middle, tip of last ventral oval, granulate. *Pygidium* coarsely irregularly punctured without distinct carina. *Tibiæ* mucronate on all the legs. *Claws* with a broad obtuse tooth at the base, similar on all the feet. Length 4.5 to 6 mm. Width 1.2 to 1.4 mm.

A male from Lyme, Conn. collected by Kirk and Champlain July 4, 1911, seems to belong to this species but does not quite accord in some particulars. A male from Vicksburg, Miss., sent me by Col. T. L. Casey, agrees very well with the Pa. specimens, but it is somewhat smaller and of a lighter bronze-aeneous colour.

A female from Highspire, Pa., which agrees well with the type, shows the following sexual differences: form slightly more robust, colour bronze-aeneous, head larger and broader between the eyes, more densely punctate, less pubescent, aeneous in colour; prothorax less narrowed behind; elytra slightly dilated behind the middle; the median area of denser pubescence of the male is here lacking. Two females from Jeannette, Pa., are somewhat smaller and resemble the males more nearly in form. I have also seen a male from Lafayette, Ind., June 21, 1907; collection of Mr. A. B. Wolcott, Chicago, Ill.

In the type there is an apparent carina of the pygidium which is caused by a median smooth space sharply limited by the coarse and irregularly confluent punctuation on each side of it. The punctures are very sparsely placed toward the margin. The pygidium of a single male that I have dismembered shows similar characteristics.

Agrilus auricomus, new species. *Holotype* a male. Form elongate, depressed, broadest at the base of the elytra, black or olivaceous black, shining; thorax shining aeneous with a path of golden pubescence in the lateral depression extending to the anterior angles. *Antennæ* reaching the middle of the prothorax, aeneous, serrate from the fourth joint. *Head* densely coarsely punctate, becoming transversely strigate above the middle; occiput feebly impressed; the median impressed line extending from the back of the head nearly to the clypeus; a triangular patch of golden pubescence above the clypeus, the suture of which is indicated by a fine carina; granulations of the eye unusually fine or indistinct. *Prothorax* one-third wider than long, base very slightly wider than the apex, at the middle equaling the elytra at the base, sides regularly arcuate, lateral margin sinuate; disk depressed and with a shallow median impression; two small circular foveæ each side in front of the middle, vaguely defined by surrounding smooth space; lateral depressions deep, causing sides to appear explanate; surface transversely strigate; hind angles with a faint carina. *Scutellum* carinate at the sides, interrupted at the middle. *Elytra*

slightly sinuate behind the prominent humeri, feebly broadened behind the middle, basal depressions deep with two very faint impressions behind them; the junction of the discal flattened portion with the convex sides of the elytra has the appearance of obtuse costæ curving inward from the humeri and vanishing near the middle of the elytra; apices separately rounded, subacute and serrulate; surface coarsely imbricate-granulate. *Body* beneath shining aeneous with golden pubescence which is sparse on the middle of the abdomen and becomes very dense on the episterna, sides of the metasternum, outer half of the coxal plates, vertical portion of the abdomen, and a triangular patch on each side of all the abdominal segments. *Prosternum* thickened, swollen behind the lobe which is slightly sinuate-truncate in front and with a distinct marginal bead; intercoxal process slightly concave, longitudinally with an acute and depressed tip; surface densely punctate. *Metasternum* rather densely punctate, becoming rather strigate at the sides. *Abdomen* with the first segment flattened and rather coarsely densely punctate at the middle, becoming strigate at the sides; second segment with a deep smooth groove with sharply defined edges narrowing and vanishing at the posterior third, sparsely coarsely punctate; last three segments finely and less sparsely punctate; apex of the last segment subtruncate with a slight tendency to emargination; median carina of the pygidium strong and projecting. *Claws* cleft alike on the middle and hind tarsi; nearly bifid on the front pair with the inner lobes less incurved; front and middle tibiæ distinctly mucronate. Length 10 mm. Width 2.4 mm. at the base of the elytra.

Three males of this species were taken at Framingham, Mass., May 31, 1909. One of these is now in the collection of Prof. H. C. Fall, Pasadena, Cal., and to him I am indebted for an examination of this specimen with reference to the above description. There is very little variation in the two specimens in my collection, the type being slightly more cuneate in form.

A female collection by Mr. A. B. Champlain at Lime, Conn., now in the Experiment Station collection at New Haven, May 29th, 1910, is referred to this species. It differs in being more black in colour (but not the opaque black of *bilineatus*) and more robust in every way while being only slightly longer — 10.8 mm. The occiput is more impressed, and the granulations of the eyes normal. The carina of the hind angles of the thorax is more distinct; the prosternal lobe shows a slight emargination in front and is less swollen behind it. The punctuation is more dense beneath and the golden pubescence covers less area. The claws are cleft alike on all the feet, the inner lobe being nearly as long as the outer and somewhat incurved. The last abdominal segment is slightly eroded-granulate and faintly truncate. The thorax at the middle, the elytra at the base and at the enlargement behind the middle measure 3 mm.

Another female from New Haven, Conn., June 12, 1911, collected by Mr. B. H. Walden is similar to the preceding except in the following details: occiput less impressed; thorax with a larger and more elongate

basal depression; lacking the two anterior foveæ; lateral margin more sinuate; at middle slightly broader than the elytra at the base; carina of the hind angles obsolete; tips of the elytra more acute and prolonged and having a sutural angle equal to one-seventh the length of the elytra; between the first and second segments of the abdomen there is a distinct suture extending half way to the middle of the body; last segment rounded with the edge eroded-granulate; the pubescence is a yellowish white. Length 11.8 mm., width 3 mm. at base of elytra and 3.5 mm. behind the middle at the enlargement. The colour of this specimen is slightly olivaceous as in the type.

This species is closely related to those specimens that have been referred to by Dr. Horn (Trans. Am. Ent. Soc., Vol. XVIII., page 308) as the olivaceous variety of *acutipennis* but the form and the golden pubescence should at once separate it from that variety.

It appears to me that the term "last abdominal segment serrate" has not been hitherto clearly defined or the serrations have escaped notice in many species. In the present species the lower edge of the vertical portion of the abdomen is strongly serrate. The serrations begin near the middle of the last segment where the overhang of the superior part commences to be prominent, and, increasing in coarseness, extends to the smooth apical area where the two edges of the superior portion merge directly beneath the pygidial carina. The inferior portion of the last segment at the tip, which is the part referred to in the previous description, is granulate near the edge. In the females the first four abdominal in the larger specimen and the first three in the other are visible when the specimens are viewed from directly above. In the males only the first two segments are so visible.

The short grayish pubescence that covers the elytra and thorax in specimens of *anxius* and related species is here almost invisible except on the apices of the elytra and for a short distance along the suture. This pubescence arises from slight depressions in the furrows between the rugæ and is seen to be arcuately decumbent in a lateral view across the elytra toward the light. Under a high-power hand lens it appears as minute silvery points on the elytral disk of this species. By placing specimens with the head toward the light and the body inclined backward toward the observer pubescent spots and apical vittæ can be seen on many species that have been described as being without elytral pubescence.

In conclusion it may be said that the studies in the *otiosus* and *anxius* groups have been, so far, rather disappointing, due to the difficulty of getting series of both sexes. The only species at all abundant in this locality is *otiosus*, taken on oak leaves. The olivaceous variety of *acutipennis* has been encountered quite often on oak, and *bilineatus* occurs in favourable places on oak sprouts; but in general the species turn up singly or in pairs, with aggravating slowness. Several very interesting problems are suggested by the material at hand, and more specimens from widely separated localities may present a solution.

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THE ODONATA OF THE PRAIRIE PROVINCES OF CANADA.

BY E. M. WALKER, TORONTO.

With the exception of the short lists of captures in the Entomological Record, published in the Annual Reports of the Entomological Society of Ontario, and a few other isolated records, no information appears to be extant on the Odonata of the vast territory between Ontario and British Columbia. Before the section on the Odonata of the new Catalogue of Canadian Insects is issued, it seems, therefore, desirable to place on record in detailed form all the information we have been able to obtain on the distribution of the dragonflies of this region.

The source of this information is mainly to be found in the collections made by Messrs. J. B. Wallis, N. Criddle, T. N. Willing and N. B. Sanson, and to these gentlemen the writer wishes to express his sincere thanks for the privilege he has enjoyed of retaining specimens for study for an indefinite length of time, or permanently for his collection. The list is of a preliminary nature, and no doubt many species will be added to it in the future.

In looking over almost any collection of dragonflies from the prairie country one is apt to be struck with the large preponderance in individuals of the genera *Lestes*, *Sympetrum*, *Enallagma* and *Æshna*. These genera are also best represented in number of species, *Leucorrhinia* coming fifth. The latter genus is probably nowhere better developed in North America than here. There are doubtless also more species of *Somatochlora* from this region than appear in the present list, particularly in the less explored northern parts. Apart from this genus, the *Corduliinæ* are apparently poorly developed. The absence of *Agrioninæ* (*Calopteryginæ* Auctt.) and *Cordulegasterinæ* is probably also due to insufficient exploration. The occurrence of two species of the genus *Coenagrion* (*Agrion* Auctt.) is of much interest, one of the species being almost identical with the Palearctic *C. lunulatum*. Finally, attention may be drawn to the fact that if we include *Æshna cærulea septentrionalis*, which has been

taken at Fort Resolution, Great Slave Lake, and doubtless occurs also in Northern Saskatchewan and Alberta, the list includes all the species of dragonflies that are common to the Palæarctic and Nearctic Regions, except the essentially tropical *Pantala flavescens*. These species are *Enallagma cyathigerum*, *Anax junius*, *Æshna cærulea*, *Æshna iunceæ*, *Æshna palmata*, *Sympetrum scoticum* and *Libellula quadrimaculata*. The only genera not represented in the Palæarctic region are *Argia*, *Amphiagrion* and *Tetragoneuria*.

In the following list the names of the collectors, Messrs. Wallis, Criddle, Willing, Sanson and the late Dr. Fletcher, are abbreviated: Ws, C, Wg, S and F, respectively.

LIST.

1. *Lestes congener* Hagen.

MANITOBA.—Aweme, Aug. 29, 1907, 1 ♂; July 10, 1909, 1 ♀ (C). Westbourne, July 27, 1908, 3 ♀s; Aug. 1, 1908, 1 ♂; Aug. 20, 1908, 2 ♂s, 1 ♀; Aug. 26, 1908, 2 ♂s, 2 ♀s (Ws).

This species ranges across the continent, and is apparently most abundant in the Canadian Zone.

2. *Lestes unguiculatus* Hagen.

MANITOBA.—Aweme, Aug. 5, 6, 1907, 2 ♂s; July 10, 1909, 1 ♀ (C). Westbourne, July 27, 1908, 2 ♂s, one teneral; July 29, 2 ♂s, 1 ♀, incl. pair in cop.; Aug. 10, 14, 2 ♂s (Ws). Winnipeg, July 9, 1908, 2 ♂s, 1 ♀ (Ws).

SASKATCHEWAN.—Regina, 3 ♀s (Wg); Aug. 7, 1903, 2 ♂s (F). Goose Lake, July 20, 1907, 1 ♂, 2 ♀s, teneral (Wg). Davidson, Aug. 21, 1907, 1 ♀ (Wg). Radisson, July 29, 1907, 2 ♂s, 2 ♀s (Wg, F). Lumsden, Sept. 10, 1906, 1 ♂ (W. J. Alexander).

ALBERTA.—Near Waterton Lake, Aug. 5, 1908, 1 ♂; Aug. 10, 1908, 1 ♂, 2 ♀s (E. V. Cowdry).

A transcontinental form, inhabiting chiefly the Transition and Upper Austral Zones.

3. *Lestes uncatatus* Kirby.

MANITOBA.—Aweme, Aug. 18, 30, 1907, 2 ♀s (C). Westbourne, July 27, 1908, 2 ♂s, 2 ♀s, incl. pair in cop.; July 29, 1908, 1 ♂; Aug. 10, 1908, 1 ♂ (Ws). Winnipeg, July 24, 1908, 1 ♂, 1 ♀ (Ws).

SASKATCHEWAN.—Regina, July 17, 1907, 1 ♂, 1 ♀ (F); June 19, 1908, 1 ♀ (Wg). Goose Lake, July 19, 20, 1907, 3 ♂s, 5 ♀s (F).

Another transcontinental species. Very common on the Canadian prairies.

4. *Lestes disjunctus* Selys.

MANITOBA.—Aweme, Aug. 5, 1905, 1 ♂ (C). Westbourne, July 27, 1908, 6 ♂s; July 29, 1908, 1 ♂, 2 ♀s; Aug. 10, 1908, 1 ♂; Aug. 29, 1908, 1 ♀ (W-). Winnipeg, July 4, 1908, 4 ♂s, 2 ♀s (Ws).

SASKATCHEWAN.—Regina, July 17, 1907, 1 ♀ (F), 1 ♀ (Wg). Duck Lake, July 22, 1907, 10 ♂s, 9 ♀s (F, Wg).

ALBERTA.—Banff, July 11, 18, 1908, 3 ♀s (S).

This is probably the commonest Canadian *Lestes*, and like the other species listed here, is widely distributed, occurring from Nova Scotia to British Columbia.

5. *Argia vivida* Hagen.

ALBERTA.—Banff, swamp off Hot Springs Road, June 21, 1908, 1 ♂, teneral (S).

This species has already been reported from this locality and from Glacier, B. C., by Osburn (Ent. News, XVI, 1905, p. 187). It probably does not belong to the prairie fauna.

6. *Nehalennia irene* Hagen.

MANITOBA.—Aweme, July 25, 1908, 2 ♀s; July 4, 1909, 1 ♀ (C). Westbourne, July 27, 29, 1908, 1 ♂, 2 ♀s (Ws). Winnipeg, July 7, 1908, 1 ♂, 1 ♀ (W-). Winnipeg Beach, Lake Winnipeg, June 19, 1909, 3 ♂s, 4 ♀s (Ws).

These are the most westerly records for this species in Canada.

7. *Amphiagrion saucium* Burm.

MANITOBA.—Aweme, June, 1911, 1 ♀, teneral (E. Criddle).

This species is known also from Quebec, Ontario and British Columbia, but appears to be very local in Canada.

8. *Coenagrion resolutum* Hagen. (Pl. IX, figs. 1, 1a.)

Though the males of this species are readily distinguished by the peculiar form of the abdominal appendages, it may be worth while to record a description of the colour-pattern of both sexes, as I have

before me some excellently preserved alcoholic specimens, received from Mr. T. N. Willing, of Regina, Sask.

Male: Head bronze-black above, postocular spots blue, posterior margin of occiput yellowish green. Eyes pale green, dark olivaceous above. Face, including a broad front margin of the frons, pale green or greenish yellow, except the nasus, which is bronze-black. Pronotum bronze-black, the anterior and lateral lobes, a marginal line along the sides of the posterior lobe and a spot on each side mesad of the lateral lobes, black. Thorax bronze-black, the humeral bands pale green to bluish green, slightly curved, rounded at both ends, widest in front, more or less constricted towards the posterior end. Pleura pale bluish to yellowish green, becoming more yellowish beneath. Abdomen pale blue above, yellowish green beneath, marked with bronze-black as follows: Segs. 1-3 as in fig. 1; slightly more than apical half of 4 and 5; 6 and 7, except a very narrow interrupted basal line; 10 dorsally, except a greenish median spot at the posterior margin. The superior appendages black, their slender inferior processes and the inferior appendages black-tipped.

Female: Colour variable, the pale markings being sometimes blue above, as in the male, but varying to wholly greenish yellow. Markings of head and thorax similar to those of the male, but the postocular spots are larger, and the posterior pale marginal line of the pronotum is entire or barely interrupted. Abdominal segments marked above with dark bronze as follows: Segs. 1-3 as in figure 1a; 4-6 except a basal interrupted line; 7 except a basal interrupted line and a bluish apical line; 8 and 9 except a bluish apical band; 10 with a subtriangular dorsal spot.

MANITOBA.—Winnipeg, July 7, 1908, 1 ♂ (Ws). Winnipeg Beach, Lake Winnipeg, June 19, 1909, 12 ♂s, 1 ♀ (Ws).

SASKATCHEWAN.—(Locality not given.) June 20, 1908, 5 ♂s, 3 ♀s.

A widely-distributed boreal species, occurring locally also in the Transition Zone.

9. *Coenagrion angulatum*, sp. nov. (Pl. IX, figs. 2, 2a, 2b, 2c.)

Closely allied to *C. lunulatum*, from which it differs somewhat in the form of the abdominal appendages of the male.

The pale terminal tubercle of the superior appendages is shorter and more broadly rounded, and the angle between it and the inferior

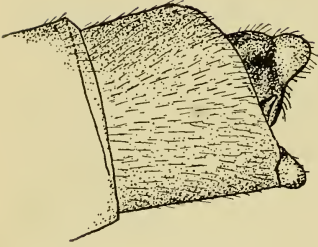
process is shallower ; the apices of the inferior appendage are much smaller and do not project beyond the latter process, as in *lunulatum* ; while the inferior process of the inferior appendage is shorter, broader and blunter than in *lunulatum*.

Male: Azure blue above, greenish yellow beneath. Head black above, postocular spots blue, rather large ; eyes pale green, dark olivaceous dorsally. Face pale green ; nasus and a line between rhinarium and labrum black, middle lobe of labrum pale bluish. Pronotum black, anterior lobe blue, lateral lobes pale yellowish green. Thorax bronze-black, the blue humeral bands about as broad as the black bands laterad of them, straight or but feebly curved, the margins subparallel ; pleura blue, fading beneath into pale yellowish. Legs pale yellow, outer surfaces of femora and inner surfaces of tibiae and whole of tarsi black. Abdomen blue above, yellowish beneath, marked above with bronze-black as follows : Seg. 1 with a transverse basal spot ; 2 with a narrow transverse angular spot and an apical transverse band ; 3 except the basal two-sevenths ; 4 except the basal fifth ; 5 except a pair of spots on the basal sixth ; 6 and 7 except a narrow interrupted basal line ; dorsum of 10, or a laterally constricted spot upon it. Superior appendages black, with a pale terminal tubercle, inferior appendages pale, the sides and apices black.

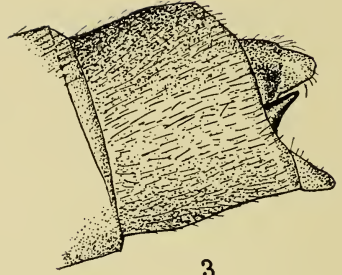
The female resembles that of *C. resolutum*, differing as follows : The posterior margin of the pronotum is slightly trilobate, the middle portion arcuate as seen from behind (not at all trilobate in *resolutum*), the pale posterior margin is narrower and sometimes confined to this middle lobe ; the thoracic bands, as in the male, are straighter, somewhat broader and the sides more nearly parallel. The abdomen is marked similarly to that of *C. resolutum*, but the dark areas are somewhat more extensive on segs. 1-3, and on 7 there is a basal interrupted pale band, which is absent in the latter species. The dorsum of 10 is entirely dark, except a narrow posterior marginal line.

The two alcoholic specimens which I have are pale yellowish, with a reddish tinge on the thorax, the transverse bands on 7 and 8 faintly bluish.

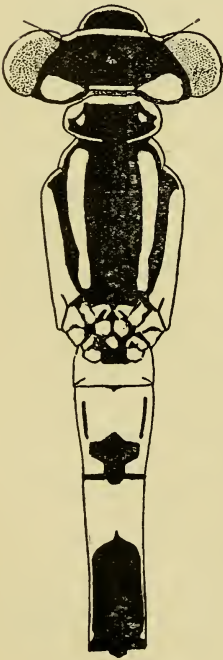
Length of body, ♂, 29-31 mm., ♀, 28-30 mm.; abdomen, ♂, 22-23.5 mm., ♀, 22-23.5 mm.; hind wing, ♂, 16-17 mm., ♀, 18-18.7 mm.



2a



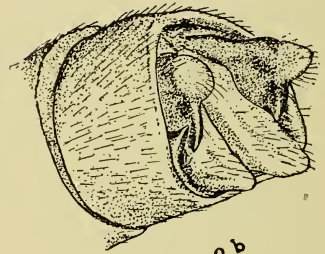
3



1



2



2b



1a



2c

Types.—♂, Carnduff, Sask., July 16, 1900 (Wg).

Cotypes: MANITOBA.—Aweme, July 4, 1905, 1 ♀ (C).
Winnipeg Beach, Lake Winnipeg, June 19, 1909, 4 ♂s (Ws).

SASKATCHEWAN.—Prince Albert, June 18, 1905, 1 ♀. Also
1 ♂, 3 ♀s from Saskatchewan without further data (Wg).

To Mr. Kenneth J. Morton is due the credit of first recognizing
the close relationship between this species and *C. lunulatum*.

Can this be the *Agrion interrogatum* Selys, described from the
female only, from Saskatchewan? (Bull. Acad. Belg. (2) 41, p.
1254, 1876).

10. *Enallagma cyathigerum* Charpentier.

SASKATCHEWAN.—Prince Albert, June 18, 1905, 1 ♂ (Wg).
Kinistino, July 22, 1 ♂ (F). Duck Lake, July 22, 1907, 6 ♂s
(Wg, F).

ALBERTA.—Lethbridge, July 5, 9, 1907, 2 ♀s (Ws). Calgary,
July 10, 1903 (Wg). Near Waterton Lake, Aug. 10, 1908, 1 ♂
(Cowdry).

I am unable to distinguish the females of this species from the
following, and therefore have not included them in the above list.
Females probably of both species have been received from the fol-
lowing localities: Aweme, Man., July 1, 1909, 1 ♀ (C). Winni-
peg Beach, Man., June 19, 1909, 5 ♀s (Ws). Abernethy, Sask.,
June 27, 1903, 1 ♀ (Wg). Duck Lake, July 22, 1907, 18 ♀s (Wg,
F). Lethbridge, Alta., July 5, 9, 2 ♀s (Ws). Banff, Alta., June 17,
1908, 2 ♀s (S). Near Waterton Lake, Aug. 5, 1908, 1 ♀ (Cowdry).

This circumpolar species doubtless occurs also in Manitoba, as I
have taken it in Northwestern Ontario (Nipigon).

11. *Enallagma calverti* Morse.

MANITOBA.—Aweme, June 24, 1909, 1 ♂; July 4, 1909, 2
♂s (C). Winnipeg Beach, Lake Winnipeg, June 19, 1909, 2 ♂s (Ws).

SASKATCHEWAN.—Prince Albert, June 19, 1905, 1 ♂ (F).
Duck Lake, July 22, 1907, 2 ♂s (Wg, F).

ALBERTA.—Medicine Hat, June 29, 1904, 1 ♂ (Wg).
Lethbridge, July 5, 9, 2 ♂s (Ws). Banff, June 17, 1908, 1 ♂ (S).
Laggan, 1 ♂ (J. E. Bean).

The females, as stated above, are listed with the preceding
species, from which they are apparently inseparable.

These two closely-allied boreal species seem to be the commonest *Enallagmas* of the prairies. I believe that they are one and the same species, as I have seen males which could be placed about equally well in either species.

12. *Enallagma hageni* Walsh.

MANITOBA.—Westbourne, July 27, 1908, 2 ♂s, 1 ♀ (Ws).

SASKATCHEWAN.—Regina, July 17, 1907, 1 ♀? (F).

Apparently rarer than in Ontario, where it is by far the commonest *Enallagma*, except, perhaps, in the far north.

The record from Regina is quite doubtful, as the females of this species are difficult to separate with certainty from certain allied species.

13. *Enallagma ebrium* Hagen.

MANITOBA.—Westbourne, July 27, 29, 1908, 3 ♂s, 5 ♀s (Ws). Winnipeg, July 7, 1908, 1 ♀; July 24, 1908, 2 ♂s (Ws).

SASKATCHEWAN.—Carnduff, July 16, 1900, 2 ♂s (Wg).

This species is not known in Canada west of Saskatchewan.

14. *Enallagma civile* Hagen.

MANITOBA.—Winnipeg, July 9, 1908, 1 ♂; July 28, 1908, 1 ♀ (Ws).

This is the northern limit of this species as far as known.

15. *Ophiogomphus rupinsulensis* Walsh.

MANITOBA.—Aweme, June 30, 1907, 2 ♂s; July 19, 1910, 2 ♀s (C).

SASKATCHEWAN.—Saskatoon, July, 1907, 1 ♂ (Wg).

The dark markings of the thorax are less distinct than in specimens from Algonquin Park, Ont.

The females were quoted doubtfully in the Entomological Record for 1911 as *O. severus* Hag.

16. *Ophiogomphus severus* Hagen.

ALBERTA.—Lethbridge, July 8, 1909, 1 ♂ (Ws).

This specimen was compared with specimens of *O. severus* in the Hagen collection (Museum of Comparative Zoology, Cambridge, Mass.).

17. *Gomphus externus* Hagen.

MANITOBA.—Aweme, June 30, 1907, 1 ♀; July 22, 1909, 1 ♂; July 9, 1910, 1 ♂ (C, Ws). Winnipeg, June 25, 1910, 1 ♂, 1 ♀ (C).

18. *Gomphus notatus* Rambur.

MANITOBA.—Aweme, July 19, 1910, 4 ♂s, 3 ♀s (C, Ws).

This species was determined by Mr. E. B. Williamson, as I had never met with it before. It has also been recorded from the Province of Quebec.

19. *Æshna sitchensis* Hagen.

MANITOBA.—Winnipeg Beach, Lake Winnipeg, Sept. 6, 1909, 1 ♂ (Ws). Westbourne, Aug. 19, 1908, 1 ♂ (Ws).

SASKATCHEWAN.—2 ♂s, 1 ♀. (Exact locality not given. Scudder, Museum of Comparative Zoology.)

This boreal species ranges from Newfoundland to Alaska.

20. *Æshna juncea* Linné.

ALBERTA.—Banff, July 17, 1902, 2 ♀s (R. C. Osburn, S).

Circumpolar and common in the Boreal Region of North America.

21. *Æshna subarctica* E. M. Walker.

MANITOBA.—Winnipeg, Sept. 9, 1909, 1 ♀ (Ws).

This is the western limit of this species so far as known.

22. *Æshna interrupta lineata* E. M. Walker.

MANITOBA.—Aweme, July 20, 1906, Aug. 10, 1907, Aug. 16, 1908, 2 ♂s, 2 ♀s (C). Winnipeg, July 6-24, Sept. 7, 1908, 5 ♂s, 5 ♀s (Ws). Winnipeg Beach, Lake Winnipeg, Aug.-Sept. 6, 1909, 2 ♂s, 3 ♀s (Ws). Westbourne, July, 1907, Aug. 16, 1908, 2 ♂s, 2 ♀s (C). Swan River, Sept. 8, 1906, 1 ♀ (W. J. Alexander).

SASKATCHEWAN.—Meota, July 8, 1907, 1 ♂, 1 ♀ (Wg). Carlton, July 28, 1900, July 22, 1907, 3 ♂s (F. Wg). Duck Lake, July 22, 1907, 2 ♂s, teneral (F. Wg). Goose Lake, July 21, 1907, 1 ♂ (Wg). Parkside, July 24, 1907, 1 ♂, teneral (Wg). Regina, July 18, 1905, 4 ♂s, 2 ♀s (Wg). Moose Jaw, Aug. 24, 1908, 1 ♀ (Caudell).

ALBERTA.—Banff, Aug. 4, 1906, Aug. 16, 1908, 1 ♂, 1 ♀ (Currie, S). Waterton Lake, Aug. 7-10, 1908, 2 ♂s, 3 ♀s (E. V. Cowdry).

I have also 1 ♂, 2 ♀s from Banff, taken Sept. 6, 1906, and Sept. 1, 10, 1908 (S), which approach the race *interna* Walk. Similar intermediates are found in British Columbia. In the prairies country only the pure *lineata* occurs.

This is the most characteristic dragonfly of the Great Plains in Canada.

23. *Aeshna eremita* Scudder.

MANITOBA.—Husavick, July 8, 1910, 1 ♂ (Ws).

SASKATCHEWAN.—(Without definite locality.) 6 ♂s, 3 ♀s (Kennicott).

ALBERTA.—Banff, 1 ♂ (S).

This is the most generally distributed *Aeshna* of the Boreal Region, and is very common in the wooded parts of the north.

24. *Aeshna canadensis* E. M. Walker.

MANITOBA.—Westbourne, Aug. 24, 1908, 1 ♂ (Ws).

Abundant in the Canadian Zone in the Eastern Provinces, and occurring also in British Columbia and Washington.

25. *Aeshna palmata* Hagen.

ALBERTA.—Near Waterton Lake, 4,100 ft., 3 ♂s (Cowdry). Banff, July 10, Aug. 6, 1908, 2 ♂s, 1 ♀ (S). Laggan, July 22, 1901, 1 ♂ (Osburn).

These are the extreme eastern limits of this species, which is abundant on the Pacific Coast.

26. *Aeshna umbrosa* E. M. Walker.

MANITOBA.—Winnipeg Beach, Lake Winnipeg, Sept. 6, 1909, 1 ♂ (Ws). Hilton and Treesbank, July 28, 1910, 2 ♂s (Ws).

These specimens belong very decidedly to the eastern race *umbrosa*. The western form, *occidentalis*, occurs in British Columbia, and will very likely turn up in the Rockies of Alberta.

27. *Aeshna constricta* Say.

MANITOBA.—Westbourne, Aug. 26, 29, 1908, 2 ♂s, 1 ♀ (Ws).

This eastern species is not likely to be found in Saskatchewan or Alberta. There is, however, a single record from British Columbia, which needs confirmation.

28. *Anax junius* Drury.

MANITOBA.—Aweme, Sept. 9, 1906, 1 ♀ (C).

29. *Tetragoneuria spinigera* Selys.

MANITOBA.—Winnipeg, June 17, 19, 1910, 3 ♀s (Ws, C). Aweme, June 11, 1905, 1 ♂; June 30, 1907, 1 ♂ (C).

This species occurs commonly also in British Columbia and Ontario. It is the most northern species of the genus.

30. *Dorocordulia lintneri* Hagen.

MANITOBA.—Lake Winnipeg (Hagen).

31. *Somatochlora semicircularis* Selys.

ALBERTA.—Banff, July 7, 15, 18, 1908, 1 ♂, 2 ♀s (S).

Also recorded from Laggan by Osburn. It occurs in abundance in British Columbia, and although recorded from Maine, I consider it very doubtful whether the latter record belongs to the same species.

32. *Somatochlora macrotona* Williamson.

MANITOBA.—Winnipeg Beach, June 19, 1909, 3 ♀s (Ws).
Winnipeg, June 16, 19, 1910, 2 ♂s, 4 ♀s (Ws). Husavick, Aug. 17, 1910, 1 ♀ (Ws).

In one of the males of this beautiful insect the wings are slightly tinged with yellow, in the other there is a clear yellow patch on the basal half of the wings, most distinct on the hind pair. Of the females, the wings vary considerably in the amount of flavescence. In one of the Winnipeg specimens, e.g., the basal half of both pairs is only slightly tinged with yellowish, the rest clear; in others the basal half to three-fifths is yellowish brown, while in the specimen from Husavick the wings are wholly suffused with a rather dark yellowish brown.

A male of this species was sent to Mr. Williamson for determination. It was hitherto known only from Duluth, Minn.

33. *Somatochlora albicincta* Burmeister.

MANITOBA.—Aweme, June 11, 1909, 1 ♀ (C).

ALBERTA.—Banff, July 7, 1908, 1 ♀ (S).

A species of the north, probably distributed through almost the entire Boreal Region, except the Arctic Zone.

34. *Somatochlora* sp.

I have also examined a female *Somatochlora* from Banff, Alta. (S), which I was unable to determine.

35. *Libellula quadrimaculata* Linné.

MANITOBA.—Aweme, July 12, 1906, 1 ♂; July 9, 1907, 1 ♂
Winnipeg, July 8, 9, 1908, 2 ♂s (Ws).

SASKATCHEWN.—Duck Lake, July 22, 1907, 1 ♀ (F).

Circumpolar and very generally distributed. It is common in the Eastern Provinces and in British Columbia.

36. *Libellula pulchella* Drury.

MANITOBA.—Aweme, July 9, 13, 1910, 2 ♂s (C). Husavick, July 11, 1910, 1 ♂, 1 ♀ (Ws).

These are the most northwesterly records for this common eastern species.

37. *Sympetrum scoticum* Donovan.

MANITOBA.—Aweme, Sept. 3, 1907, 2 ♀s; Aug. 10, 23, 1908, 4 ♂s, 1 ♀ (C); Aug. 28, 1908, 1 ♂ (E. Criddle). Winnipeg, Sept. 7, 1908, 1 ♂, 1 ♀ (Ws). Westbourne, July 27, 29, 1908, 4 ♂s, 6 ♀s; Aug. 1, 1908, 1 ♂, 1 ♀ (Ws); Aug. 20, 29, 1908, 14 ♂s, 12 ♀s (Ws). Grandview, Sept. 18, 1906, 2 ♂s, 1 ♀ (W. J. Alexander).

SASKATCHEWAN.—Regina, Sept., 1908, 1 ♂ (Wg). Moosomin, Sept. 13, 1906, 1 ♂ (Alexander).

ALBERTA.—Banff, July 24, 30, 1908, 1 ♂, 2 ♀s; Aug. 28, 1908, 1 ♂ (S). Beaver Lake, 1907 (A. Halkett).

Circumpolar and generally common in the Canadian Zone.

38. *Sympetrum costiferum* Hagen.

MANITOBA.—Aweme, Sept. 7, 1907, 1 ♀; Sept. 1, 1908, 1 ♂, 1 ♀ (C). Westbourne, July 24, 29, 1908, 2 ♂s, 4 ♀s; Aug. 5, 1908 (gravel pit), 3 ♂s, 5 ♀s; Aug. 14, 24, 1908, 6 ♂s, 5 ♀s (Ws). Winnipeg, Sept. 7, 1908, 1 ♂, 1 ♀ (Ws). Carberry, Sept. 6, 1906, 2 small ♀s (Alexander).

SASKATCHEWAN.—Regina, Aug. 8, 10, 1886, 1 ♂, 2 ♀s (F); Sept., 1908, 1 ♀ (Wg). Moosomin, Sept. 13, 1906, 7 ♂s, rather large (Alexander).

39. *Sympetrum madidum* Hagen

SASKATCHEWAN.—Battleford, July 2, 1907, 1 ♂ (Wg).

The two rows of cells between Rs and Rspl are imperfectly developed in this specimen.

S. madidum is also known from British Columbia.

40. *Sympetrum rubicundulum decisum* Hagen.

MANITOBA.—Aweme, Aug. 5, 1907, 1 ♂, 1 ♀, teneral; Aug. 19, 1908, 1 ♀ (C). Treesbank, July 20, 1908, 1 ♂ (Ws). Winnipeg, July 6, 1908, 1 ♂ (Ws). Westbourne, July 27, 31, 1908, 3 ♂s, 7 ♀s; Aug. 10, 20, 1908, 1 ♂, 3 ♀s (Ws). Deloraine, July 6 (F). Grandview, Sept. 18, 1906, 1 ♀ (Alexander).

SASKATCHEWAN.—Indian Head, July 22, 1903, 1 ♀ (Wg). Regina, Aug. 10, 1886, 2 ♂s, 4 ♀s (F); Aug. 7, 1903, 1 ♂, 1 ♀ (Wg). Lumsden, Sept. 10, 1906, 1 worn ♂ (Alexander). Davidson, Aug. 21, 1907, 1 ♀ (Wg). Goose Lake, July 19, 20, 1907, 2 ♂s, 2 ♀s (F, Wg). Saskatoon, July 16, 1906, 1 ♂ (Wg). Duck Lake, July 22, 1907, 1 ♂, 2 ♀s (F). Kinistino, July 25, 1907, 4 ♂s, 2 ♀s (F, Wg). Birch Hills, July 25, 1907, 3 ♀s (Wg). Carlton, 1 ♀ (F).

ALBERTA.—Cardston, July 23, 1900, 1 ♀ (Wg). Beaver Lake, 1907, 4 ♀s (O. Halkeit). Banff, July 21, 1908, 3 ♂s; Aug. 3, 1908, 1 ♂; Aug. 10, 1908 (summit of Sulphur Mt.), 1 ♀; Aug. 24, 1908, 1 ♀ (S). Near Waterton Lake, Aug. 10, 24, 1908 4 ♂s, 4 ♀s (Cowdry).

This is perhaps the commonest dragonfly of the prairie region.

41. *Sympetrum obtusum obtusum* Hagen.

MANITOBA.—Westbourne, July 27, 1908, 1 ♂; Aug. 10, 26 4 ♂s, 1 ♀ (Ws). Swan River, Sept. 8, 1906, 3 ♂s, 1 ♀ (Alexander).

42. *Sympetrum obtusum morrisoni* Ris.

ALBERTA.—Near Waterton Lake, Aug. 5, 1908, 1 ♀ (Cowdry).

A pale specimen, the femora pale in the basal half.

43. *Sympetrum corruptum* Hagen.

MANITOBA.—Aweme, Sept. 15, 1907, 1 ♂; Sept. 8, 1908, 2 ♀s (Ws). Winnipeg, July 8, 1908, 1 ♀; Sept. 7, 1908, 2 ♀s, teneral (Ws).

SASKATCHEWAN.—Regina, Aug. 10, 1886, 1 ♀ (F).

ALBERTA.—Lethbridge, July 7, 1909, 1 ♀ (Ws). Banff, Sept. 13, 1897, 1 ♂, 1 ♀; July 15, 1908, 1 ♂; July 27, 1908 (trail above Hot Springs), 1 ♀ (S). Laggan, 1 ♀ (J. E. Bean).

This species appears to be very much commoner in the Western Provinces than in Ontario, where it is very local.

44. *Leucorrhinia borealis* Hagen,

MANITOBA.—Bird's Hill, June 5, 1909, 3 ♂s, 2 ♀s (Ws). Aweme, July 15, 1907, 1 ♀, somewhat teneral; June 4, 9, 1909, 2 ♀s (C).

ALBERTA.—Banff, June 17, 1908, 1 ♂ (S).

Except the original record from Hudson's Bay, these are the only localities for this species known to me.

45. *Leucorrhinia proxima* Calvert.
 MANITOBA.—Winnipeg Beach, Lake Winnipeg, June 19, 1909, 1 ♂ (Ws).
 Occurs in the Canadian Zone across the continent.
46. *Leucorrhinia glacialis* Hagen.
 MANITOBA.—Aweme, June 11, 1911, 1 ♀ (C).
47. *Leucorrhinia hudsonica* Selys.
 MANITOBA.—Winnipeg, July 27, 1908, 1 ♀ (Ws). Winnipeg Beach, June 19, 1909, 1 ♂, 2 ♀s (Ws).
 ALBERTA.—Laggan, 1 ♂ (J. E. Bean).
 A transcontinental species of the Boreal Region.
48. *Leucorrhinia intacta* Hagen.
 MANITOBA.—Aweme, June 21, 24, 1911, 2 ♀s, teneral; July 9, 1910, 1 ♀ (Criddle). Winnipeg, July 9, 1908, 1 ♂, 2 ♀s (Ws). Winnipeg Beach, June 19, 1909, 2 ♂s (Ws).
 This last record is the most northerly for this species.
49. *Pantala hymenaea* Say.
 MANITOBA.—Husavick, July 8, 1910, 1 ♂ (Ws).
 The capture of this southern species in Manitoba was wholly unexpected. It has since been taken on Pelee Island, Ont., by F. M. Root.

EXPLANATION OF PLATE IX.

Fig. 1.—*Coenagrion resolutum* (♂), dorsal view of head, thorax and abd. segs. 1-3; 1a (♀), dorsal view of segs. 8-10.

Fig. 2.—*Coenagrion angulatum* (♂), dorsal view of head, thorax and abd. segs. 1-3; 2a (♂), lateral view of seg. 10 and appendages; 2b, same, viewed obliquely from behind; 2c (♀), dorsal view of segs. 8-10.

Fig. 3.—*Coenagrion lunulatum* (♂), lateral view of seg. 10 and appendages. (Specimen from Jena.)

Dr. C. Gordon Hewitt, Dominion Entomologist, left for England on July 26th to represent Canada at the International Congress of Entomology, which was held at Oxford from August 5th to 10th.

Subsequently he attended a conference which the Secretary of State for the Colonies arranged at the Colonial Office for the purpose of working out a scheme for Imperial co-ordination in the prevention of the spread of insect pests and the more extended investigation of the noxious insects which occur in the different parts of the Empire.

PROVINCIAL ENTOMOLOGIST FOR ONTARIO.

The Ontario Department of Agriculture has appointed Mr. Lawson Cæsar, B. A. and B. S. A (University of Toronto), Provincial Entomologist for Ontario. Mr Cæsar will have charge of all the Inspection work throughout the Province and will carry out investigations concerning the depredations of insects and injuries caused by plant diseases. He will continue his connection as Lecturer in the Department of Entomology at the Ontario Agricultural College, during the winter months. This is the first appointment of the kind to be made in Canada and will it is hoped be followed by some of the other Provinces before very long. Mr. Cæsar is well known as an economic entomologist and as a Lecturer to Farmer's Institutes and Meetings of Fruit Growers. He is also the writer of Bulletins on the Lime-Sulphur Wash, The Codling Moth, Little Peach Disease and a Spraying Calendar.

THE DIVISION OF ENTOMOLOGY, OTTAWA.

It has been suggested that an account of the recent work and developments of the Division of Entomology of the Dominion Department of Agriculture would be of interest to the readers of THE CANADIAN ENTOMOLOGIST. Believing this to be the case, the following notes have been written for our entomological friends.

The most important development of the activities of the Division is the extension of the field work by means of field laboratories or stations. It is obvious that work on the more serious insect pests occurring in different parts of Canada could only be carried out in the regions where such pests occur. The method of carrying on all investigations at the Central Experimental Farm, Ottawa, where the Division of Entomology is located, not only had serious limitations but the results might not be applicable to local conditions. The Brown-tail Moth and its parasites must be studied in the regions where the insect occurs ; so also in the case of such pests as the Apple Maggot, the Bud-moth and other pests.

During the present season six field stations have been established. In three cases the laboratory consists of a two-roomed portable cottage, in one case the Ontario Department of Agriculture has given us the use of a room in the Jordan Harbour Experiment Station and in the other two cases temporary quarters at farm houses are being used. The stations and work are distributed as follows:

In Nova Scotia, Mr. G. E. Sanders occupies an entomological laboratory located at Bridgetown, N.S., from which he is directing the work of San José Scale inspection pending the appointment of a provincial entomologist. The San José Scale was discovered in Nova Scotia by Mr. Sanders during the Brown-tail Moth work. Investigations are also being made on the Bud-moths (*Tmetocera ocellana*), Green Apple-Worm (*Xylina* sp.) and the Brown-tail Moth, special attention being devoted to parasitic work. For experimental work in the control of the Bud-moth a ten-acre orchard has been placed at the disposal of the Division of Entomology by Mr. R. S. Eaton at Kentville, N. S. where spraying experiments are being carried on.

An entomological field station is located at Fredericton, N.B., in the grounds of the University of New Brunswick. Mr. J. D. Tothill, who is in charge of the Brown-tail Moth work in New Brunswick is in charge and is devoting his attention chiefly to the breeding of the predaceous enemy of the Brown-tail and Gipsy Moths, the *Calosoma* Beetles, and their colonisation, and the study of Tachinid parasites. Through the kind co-operation of Dr. L. O. Howard and Mr. A. F. Burgess, of the United States Bureau of Entomology, we have been able to procure a supply of the European *Calosomas* and Tachinids (*Compsilura concinnata*) colonized in Massachusetts and we are now endeavouring to establish these enemies of the Brown-tail and Gypsy Moths in New Brunswick where the Brown-tail Moth was found during the last winter's scouting work, to have spread over a very large area and the intensity of the infestation will undoubtedly increase. Mr. Tothill recently visited Massachusetts for the purpose of collecting parasitised material. Studies are also being made on other insects as opportunities occur.

Mr. C. E. Petch has been recently appointed a field officer of the Division and placed in charge of the field station at Covey Hill, Quebec, where he will study chiefly insects affecting the apple, namely, Apple Maggot, Apple Curculios and the Capsid or other bugs injuring fruit. The unusual prevalence of these pests in the locality where the entomological station has been placed will afford splendid opportunities for useful work.

From the office of the Division at Jordan Harbour, Ontario, Mr. W. A. Ross is carrying on a very thorough study of the Apple Maggot or Railroad Worm which he began to investigate last year when employed by the Ontario Department of Agriculture. At St. Ives, in Middlesex County,

Ontario, Mr. H. F. Hudson is conducting an investigation on an outbreak of the Chinch Bug which proved very destructive to grass land last year. He is also making observations on Wireworm and White Grub.

In British Columbia Mr. R. C. Treherne, in addition to studying certain more serious apple pests, is investigating the Strawberry Weevils, chiefly *Otiorynchus sulcatus*, which are responsible for serious losses to strawberry growers not only in British Columbia but also in other regions. With a view to studying similar conditions elsewhere he is visiting the States of Oregon and Washington. For the present season the field laboratory is located at Hatzic, B. C.

Although no field work is being carried out in the Western or Prairie Provinces it is hoped that work will be commenced there in the near future, as there are several insect pests affecting cereals and field crops demanding attention.

Since his appointment as Assistant Entomologist, Mr. J. M. Swaine has made an excellent start in the Division's work on forest insects. In May he visited the Riding Mountain Forest Reserve in Manitoba for the purpose of liberating the parasites of the Larch Sawfly, which were imported from England, and also to study the native Bark-beetles. Other parts of Eastern Canada are being visited during the present season.

Mr. Gibson has been continuing his work on Cutworms, studying especially species from Alberta where Cutworms have been responsible for very considerable losses in certain sections of Southern Alberta where growing grain was completely destroyed. He also superintended the work on Root-Maggot control, this being the third season during which these experiments have been carried on.

The distribution of Ticks in Western Canada, with especial reference to the Rocky Mountain Spotted Fever Tick, *Dermacentor venustus* is being studied with interesting results. In the campaign against the House-fly which is now in full swing in various cities, especially in Eastern Canada, the Division is continuing to provide much powder and shot.

It is, we hope, hardly necessary to add that any assistance which local entomologists are able to render us in the various branches of work outlined above will be most welcome. This is especially the case where we are working out the distribution of certain insects, The territory which we have to cover is so great in extent that we wish to enlist all the co-operation possible.

C. G. H.

NOTES ON TAYLOR'S TYPES OF GEOMETRIDÆ.

BY WM. BARNES, M.D., AND J. H. MCDUNNOUGH, PH.D., DECATUR, ILL.

Recently Dr. Barnes has acquired by purchase the whole of the Taylor collection of Geometridæ including the types and cotypes of about 65 species described as new. Most of these types have the type-label attached but in some few instances the author, probably due to the poor condition of his health, has neglected to affix more than a small written label with the name of the species on one of the specimens, even when the original description states that several specimens were present. As however in the original descriptions he has been very careful to give full detail regarding localities and dates we have in nearly every case been able to recognize these other specimens and have considered ourselves justified in affixing "type" or "cotype" labels as the case might be. In order to account for the fact that these labels are not in Taylor's handwriting, and to give workers on the *Geometridæ* accurate knowledge concerning these types, we publish in the present article a full list of the Taylor types contained in the Barnes collection together with such notes on the same as are necessary.

Rachela pulchraria.—One ♂ with type label in Taylor's handwriting attached, dated Oct. 11th, '06, but without locality label. According to the original description the locality is Tacku River, B. C.

Eupithecia insignificata.—One ♂, type label attached, labelled "W. 15.4.04". A second specimen from Regina was apparently included under this name but to us appears to be different.

Eupithecia sublineata.—One specimen with hand-printed type label attached, labelled "W. 18.4.04". Four other specimens from Wellington, B. C. (2); Vancouver, B. C.; and Field, B. C. (Dod), are contained in the series but are not cotypes.

Eupithecia obumbrata.—Two ♀ types with printed labels "Type" and "Type 2", from Gold Stream, B. C. "10.5.03." Four other specimens taken early in May and labelled "Vancouver Is., G. W. Taylor" are also present in the series.

Eupithecia modesta.—The original description calls for both ♂ and ♀ types; the ♂ however only bears the label "*T. modesta*" in Taylor's handwriting in addition to the locality label "Vanc., 6.6.05". We have affixed to this a type label. The ♀ type with printed label is almost totally destroyed, portions of the wings being pinned under the label.

Eupithecia minorata.—Type label in Taylor's handwriting attached; there is no locality label but the round date label "22 4.05"; characteristic of material from Kaslo, B.C. sent out by Mr. Cockle, is affixed to the specimen.

Eupithecia packardata.—Type label in Taylor's handwriting on specimen labelled "Ottawa, Can., 7, VIII, 1906, C. H. Young". The series contains 5 other specimens; 2 from Montreal (A. F. Winn); 1 from Trenton (Evans); 1 from Catskill Mts.; and 1 without locality label.

Eupithecia grata.—Type label in Taylor's hand on specimen labelled "Ottawa, Can., 5 VI. 1906, C. H. Young".

Eupithecia lagganata.—1 ♂ in fair condition only, labelled type in Taylor's hand; locality "Laggan, Alta. (Dod)".

Eupithecia compactata.—The single ♀ type with label in Taylor's hand; locality "Windermere, Upper Columbia River, B. C. (Dod) 13 VII. 07".

Eupithecia spaldingi.—The specimen labelled type in Taylor's hand is very poor and almost unrecognizable. We doubt if the median band mentioned in the original description will appear so prominently in fresh specimens. The locality label is "Stockton, Ut. (Spalding), IX., 2, 03".

Eupithecia dyarata.—A hand printed type label was present but not attached to any specimen. The original description specifies as type a ♀ from Kaslo (Cockle) dated "24 IV. 06." A specimen without abdomen but apparently a ♀ is contained in the series and labelled "J. W. Cockle, 24 IV. 02." This agrees well with the original description and also with topotypes received from Mr. Cockle; we imagine that the "06" is therefore either a printer's error or an oversight and have placed the label on this specimen.

Eupithecia scelestata.—This species was described from four specimens labelled Kaslo, B. C., and dated respectively 21st April, 2nd and 3rd May, 1903 and 4th May 1905. All these specimens are in the series but only the specimen dated 2nd May, 1903, which, by the way, is the poorest specimen of the lot, bears a type label. We have affixed cotype labels to the other three specimens.

Eupithecia winnata.—A ♀ in rather poor condition has a type label in Taylor's handwriting. There should be two cotypes in Mr. Winn's collection.

Eupithecia alberta.—Both specimens mentioned in the description are present with hand printed type labels "Type 1" and "Type 2".

Eupithecia regina.—Type and 3 cotypes with hand printed labels attached; the fourth cotype mentioned dated "Aug. 2nd, 1903" is missing.

Eupithecia youngata.—Type and 2 cotypes with printed labels. The type specimen from Ottawa has only two wings left but the cotypes from Catskill Mts. are in good condition.

Eupithecia dodata.—Type specimens labelled "Type 1" and "Type 2" present.

Eupithecia adornata.—Type specimen with printed label "From Calgary, Alta., 10.VI. 95". Four cotypes are also labelled, the fifth one (of the date June 14th) being missing.

Eupithecia olivacea.—Both specimens which served for the original description are present, correctly labelled.

Eupithecia terminata.—Two specimens present both labelled "cotype" in Taylor's handwriting.

Eupithecia helena.—A single somewhat faded specimen with printed type label attached.

Eupithecia perbrunneata.—There are no specimens labelled type; one specimen from Kaslo "31.V. 07" is labelled in Taylor's hand "E. perbrunneata Tayl. = laricata Dyar, not Freyer, three types". Two of the specimens mentioned in the original description we have found in the series, viz. those labelled Kaslo, May 23rd, and June 2nd; these we have made type and cotype respectively. The Victoria specimen mentioned is not to be found.

Eupithecia placidata.—A single ♀ specimen labelled "cotype" in Taylor's hand is present.

Eupithecia slocanata.—The ♂ and ♀ mentioned in the original description are present, both labelled "cotype".

Eupithecia fletcherata.—One type, "Ottawa, Can., 3. VIII. 06"; type label in Taylor's handwriting.

Eupithecia bryanti.—The type ♀ alone has printed label attached; of the six cotypes mentioned in the description we have discovered four, all in poor condition, viz. those dated 27th (2), 28th and 29th July; to these we have affixed cotype labels.

Eupithecia harveyata.—Both specimens present with printed labels "Type" and "Type 2".

Eupithecia hanhami.—One of the two specimens mentioned by Taylor in the description, one labelled "Victoria, B. C., 5. VI. 03" has a type label affixed; the second specimen dated 25th June, 02 (not 05 as stated), simply bears a label in Taylor's hand "*Eupithecia hanhami*".

Eupithecia indistincta.—Single type with two written type labels affixed.

Eupithecia gibsonata.—The specimen with type label is dated "9.4. 03, No. 94" not "9. VI." as stated in description. A second specimen "4 4.03" is also present.

Eupithecia fasciata.—Two types with labels; type 1 from Ottawa, type 2 with no locality label; a very poor specimen, presumably the one mentioned as having been received from Mr. Kearfott.

Eupithecia quebecata.—Two specimens with written type labels; "Type 1" from Kamouraski 26.8. 98; type 2 from Biddeford, 23. 7.99.

Eupithecia fumata.—A single type specimen labelled in Taylor's handwriting; locality as stated in description.

Eucymatoge rectilineata.—A written type label attached to a very worn specimen; locality as stated in description.

Eucymatoge vancouverata.—The single type is a ♀ with handprinted type label attached; the collection contains a splendid series of both sexes.

Entephria takuata.—Of the four specimens which served for the original description only three were in the collection and none marked as types; one however is labelled "*Mesoleuca takuata* T." in Taylor's hand and this we have made the type; it is ♀, dated 4th Aug., 06 and in good condition; the other two specimens which bear date labels agreeing with the dates of original description, we have made cotypes.

Entephria lagganata.—No type labels affixed but all four type specimens can be identified by the dates. A specimen labelled "Laggan, Alta., 9. VIII. 00, 5700 ft." and marked in Taylor's handwriting "*Mesoleuca lagganata* T." we have made type, the others becoming cotypes.

Eustroma harveyata.—Single type specimen as stated in description type label attached.

Zenophleps victoria.—The single ♀ type is labelled; one wing is damaged. A second ♀, also from Victoria, B.C., is present.

Mesoleuca hulstata.—No type labels attached. Five specimens labelled "Claremont, Cal. Baker" as stated in description were present; one of those bore the label "*Mesoleuca hulstata* Taylor" in Taylor's hand; this

we have made the type, the others cotypes. All are in rather poor condition.

Mesoleuca occidentata.—Both types present with labels in Taylor's handwriting.

Mesoleuca occidentata, var. *mutata*.—No type labels; the three specimens mentioned in the description are present, one labelled "var. *mutata*" in Taylor's hand. On this we have placed a type label, on the other two cotype labels.

Mesoleuca hersiliata var. *mirandata*.—Type with label attached.

Mesoleuca boreata.—Two specimens with written type labels, both in very rubbed condition. They appear to us nothing but an extreme form of var. *mutata* and it is even possible that the lack of orange scales is due to the poor condition of the specimens. We have several specimens from Victoria and Duncans, B.C., which show only traces of orange scaling.

Mesoleuca casloata.—Of the three specimens mentioned in the description only two are present, one with label "M. casloata Taylor". This we have made the type, the other cotype.

Mesoleuca decorata.—Three types present as stated.

Hydriomena multipunctata.—The single type with written type label; the species is very close to *indefinita* Grossbeck.

Hydriomena manzanita.—Type with handprinted label attached.

Hydriomena autumnalis, var. *columbiata*.—Of the four specimens mentioned in the description only three are present, one bearing a hand-printed type label; the other two dated respectively May 23rd and 27th we have made cotypes.

Hydriomena magnificata.—One ♀ type with written type label.

Petrophora fossaria.—The specimen from Mt. Cheam, B.C., bears a type label; the other specimens mentioned from Laggan, B.C., we have also found and to these affixed cotype labels.

Petrophora pontiaria.—One ♀ type as stated in description; the other three specimens mentioned are present and have received cotype labels.

Petrophora circumvallaria.—No type labels; the four specimens mentioned as types are present and we have labelled them so. The species cannot be distinguished from the European *turbata*.

Petrophora planata.—A pair from New Brighton, Pa., have type labels attached; the name falls before *iduata* Gn. as pointed out by Dr. Dyar.

Leptomeris subfuscata.—1 ♂ from Goldstream, B.C., only bears a type label; the ♀ type mentioned is present and to this we have affixed a type label. Of the other species referred to in the description we have found the three from Vernon, B.C., and 1 ♂ from Goldstream, B.C., and on these have affixed cotype labels. Concerning the three specimens from Victoria, B.C., there are two labelled "Victoria" without date, and 1 specimen with date "30 V" but no locality; we have refrained from making these cotypes as they cannot be definitely identified.

Aplodes unilinearis.—One ♂ type with written label.

Aplodes hudsonaria.—Two types, one with handprinted, the other with written label.

Delinea bryantaria.—One ♂ type with printed label in rather poor condition.

Sciagraphia purcellata.—Type and cotype with written labels; type in good condition, other specimen poor.

Diastictis hulstiana.—A type label unaffixed is present; there is evidently no type specimen, the name being merely *nom. nov.*

Macaria quadrifasciaria.—The one damaged type specimen as stated in description.

Enemera simularia.—♂ and ♀ types with written labels, both specimens in wretched condition.

Enypia packardata.—A single ♂ bears a printed type label; the other five specimens mentioned are not clearly enough indicated to warrant type labels being affixed.

Gabriola dyari.—Taylor states that four specimens, all dated "August 1903" served for the description. The type label however is on a specimen dated "28.VII.03". The three other specimens dated "19th and 21st Aug." are present and to these we have affixed cotype labels.

Sabulodes costinotata.—The two cotypes present are from Prescott, Ariz., not Phoenix as stated in the description.

Sabulodes arizonata.—Two cotypes with written labels are in the collection.

Besides the above the following types were contained in the collection:—*Eupithecia latipennis* Hulst.; *Eupithecia frostiata* Swett; *Eupithecia kootenaiata* Dyar (cotype); *Eupithecia niphadophilata* Dyar (cotype); *Anthelia taylorata* Hulst. (one side broken off); *Phigalia denticulata* Hulst.; *Euclena abnormalis* Hulst. (without much doubt a suffused aberration of one of the other species, possibly *pectinaria*.)

SOME CANADIAN SAWFLIES COLLECTED BY
FREDERICK KNAB.

BY S. A. ROHWER, WASHINGTON, D. C.

In June, 1907, Mr. Frederick Knab spent some time in the Oxbow region at Saskatchewan, where he collected a number of insects. The sawflies which were collected have been given to the United States National Museum, and have been determined and placed in the collection. As some of the species are new to Canada, and as nearly all the records will add to the distribution of the species, a list of them is now presented, as it may be useful to those who are editing "Insects of Canada."

The following were collected at Oxbow, Saskatchewan, which is a prairie region with a number of small ponds, around which various willows grow.

Pamphilius (*Pamphilius*) *nigritibialis* Rohwer.

Arge spp.

Cimbex americana, var. *decemmaculata* Urban.—Female.

Zaraca inflata Norton.—June 15. Female.

Dolerus agristus MacGillivray.—June 11 to 18, 1907. Three typically-coloured females. Four females which have the venter and the terminal dorsal segments blackish.

Macrophyia succincta Cresson.—Female, June 17, 1907.

Tenthredella erythromera (Provancher).—Female, June 18, 1907.

Empria maculata (Norton).—Female, June 19, 1907. A small specimen with a narrow sheath.

Hoplocampa xantha Rohwer.—Three females, June 15, 1907.

Lycaota spissipes (Cresson).—Females, June 17 and 21 ; male, June 15.

Paracharatus rudis (Norton).—Female, June 15, 1907.

Paracharatus nigrisoma Rohwer.—June 21, 1907.

Monophadnus truncatus Rohwer.—June 1, 1907.

Amauronematus lincolnensis Rohwer.—Two females, June 1, 1907, not typical.

Amauronematus semirufus (Kirby).—May 30, 1907. Differs in a few minor points.

Amauronematus knabi Rohwer.—June 15 and 19, 1907.

The following species were collected at White River, Ontario, which is in the forest region to the north of Lake Superior :

Dolerus dysporus MacGillivray.—June 24, 1907.

Nematus erichsoni (Hartig).—June 24, 1907.

Monsoma inferntia (Norton).—Female, June 25, 1907.

COLLECTING BEES AT GUALAN, GUATEMALA.

BY WILMATTE P. COCKERELL, BOULDER, COLORADO.

In going from Quirigua to Guatemala City, we passed through a desert region—a place of curious forms of cacti, but especially interesting because of the trees and shrubs, at that time of the year, late February, covered with splendid blossoms, and usually without leaves. One tree (*Gliricidia maculata* H. B. K.) was very common and with its delicate pink flowers reminded one of the peach of the temperate zone, but inspection showed it to have a papilionaceous flower. This, I thought, would be a wonderland for bees, since bees are peculiarly adapted to desert areas.

When we returned to Quirigua, I determined to spend two or three days at Gualan, and I anxiously inquired of every one whether there was some one in the village who would befriend me, a missionary perhaps, a priest, an American who owned a coffee finca or a hotel-keeper who spoke English; and at last I found a young man who sometimes went to Gualan to buy cattle for the commissary of the United Fruit Company, and he said there was a hotel and that the negro-French proprietor did speak English, but that the place was usually full of drunken natives and was absolutely impossible for an American lady. That settled the hotel question, but I could at least go up between trains, though even for so short a time it was not considered wise for me to go alone, and Mr. Earl Morris was detailed to go with me. There was much joking about the biological altar needing a sacrifice, for my friends at Quirigua were archaeologists and were uncovering one of the wonderful old Maya temple cities, and bees looked very small to eyes focused for forty feet doorways. But Mr. Morris was a splendid assistant, and helped in every way, even if in his heart he was sighing for sculptured walls and ornate pottery. The train left Quirigua at ten o'clock and arrived at Gualan at eleven-thirty, the down train picked us up at two-thirty. It was a wonderful three hours! The lovely pink and white blossoms of *Gliricidia maculata* were visited by great Carpenter bees (*Xylocopa*), but unfortunately the flowers were so high, and the bees flew so swiftly that I secured only a few specimens.

The best catch of that day was a very small bee belonging to the genus *Perdita*, and if you saw it I am afraid you would agree with the Indians who said, "So small bugs can be of no use." The *Perditas* are among the smallest of bees, and yet the finding of one on *Cordia alba*, a yellow flowered tree, at Gualan, was a distinctly dramatic and interesting thing to me. Years ago my husband described seventy of these small bees which he had collected in New

Mexico, and half a dozen have been found in Northern Mexico, and I had often wondered whether the little bees were in Central America if some one who was interested in finding them would only look. And there it was, a new species that extended the distribution of the genus *Perdita* a thousand and more miles, and I had added a tiny fact to the everlasting why of the universe.

A few hundred yards below the village there was a number of trees covered with cardinal flowers, and I was especially anxious to collect from them, but we were beguiled into chasing butterflies, and the yellow-flowered trees had other bees than the *Perdita tropicalis*, so that it was time for the train, and we had seen only the glow of the cardinal tree from a distance.

Another trip was imperative, and on that day I had an amusing experience. The conductor of the train, a rather interesting Guatemaltecan brought me a Ladies' Home Journal and a little note which said that if I were English he would lend me the magazine; what did I do with my veil (net) and did I, like other strangers, think them savages to be conquered?

Judging that he wrote English better than he spoke it, and read better than he understood, I wrote that I was grateful for the magazine (and really, even the Ladies' Home Journal looked good to me; that I had the net to catch bees, because my husband studied bees from all parts of the world. He answered: "Thanks. Good for him and the world. Hope that he finds the Bee that carries the strength of life—like they do honey. So that the wise live long to be learned, and the fools long enough to learn."

There was more correspondence about the duty of one nation to another, the books that would give a Guatemaltecan an idea of the United States, all of which is too lengthy to record here, but just before we reached Gualan he wrote: "Guess I tire you, I like to write English to get acquainted with. Excuse me—My wish that the bees won't bite you while searching for flowers. That they sometimes on the mountains sing you a chorus. Remembering you of God, the father of all peoples."

When we reached Gualan, we went at once to the Cardinal Tree, and found it even more wonderful than we had thought. Imagine a great tree, fifty to seventy-five feet high, with branches literally covered with fragrant cardinal flowers, and the flowers swarming with wasps and bees, and on the branches great gaily colored birds assembled to eat the insects. I too wanted to collect insects, but the lowest branches were just out of reach. Mr. Morris offered to climb up and collect for me. Many Indians gathered in the path just below us, and called out to Mr. Morris

that the tree was full of 'serpents,' and that the branches would break and dash him to destruction, but he climbed on. Soon he began to beat himself, and I knew that the ants, the little guardians of the tree, were after him. Then, too, he had been obliged to crawl over some of the curious flat cactus that grows along the trunks of trees in that country, and when I added my voice to the Indians cry, "Come down," Mr. Morris said that he thought he would. We made a pile of stones and boxes, and so were able to get a few wasps and bees, but I shall never cease to envy the birds so gracefully collecting from the beautiful Guacamaya. With wings I might have secured a dozen forms new to science. I carried home a flower covered branch, and later Mr. Morris secured leaves and pods from the same tree, and great was my surprise and delight when Captain John Donnell Smith, of Baltimore, said that the tree itself was new !*

The excavations at the ruins became daily more interesting, and I could not ask Mr. Morris to spend more time with me, but most fortunately I learned that the station agent's wife spoke English, and she generously kept me at her house one night, thus, giving me the better part of two days for collecting.

I found the walls around one of the patios, here a place for chickens and turkey-buzzards instead of ferns and orchids as in Guatemala City, alive with red woolly *Centris* (*C. tarsata* Smith) nesting—there were literally thousands of them, and I spent the most of one afternoon getting specimens of these bees—and the bees (*Mesocheira bicolor* Fabr.) that were parasitic in their nests.

Then, too, there were some Megachiles (*M. gualanensis* n. sp.), leaf-cutting bees, nesting in the same wall, and they had interesting parasites (*Coelioxys sanguinosus* n. sp.). Dozens of small Indian boys watched me, and occasionally begged to be allowed to use the net. Some native teachers came out to drive the boys into school, but stayed to watch the strange 'Inglese' catching 'musca.'

"For what does she want the little bugs," they inquired of my hostess. "Does she make medicine of them?" Not such a strange supposition, since they grind up all sorts of insects and use them as medicine.

"The Senora does not gather them for medicine," they were told, but the fame of the medicine-maker spread, and a woman brought a little child with a terrible sore on his neck, and begged me to give her the fly that could cure her baby. It was pitiful !

* *Phyllocarpus* n. sp.; the genus previously known only from a single species occurring in Brazil.

A more amusing incident followed. A larger boy asked which made the best medicine, and I begged Senora Caldero to explain that the bees were for study. "How can you explain that to such ignorance," she asked, but I begged her to try, and the boy said that he understood, but a few minutes later he was telling a young girl that the little black bees were for pains in the stomach—the red ones for pains in the legs. When reproached, he excused himself by saying: "The other is much too difficult for a girl to know." The inferiority of woman serves its purpose the world over.

My adventures did not end with the day, for in the middle of the night I was awakened by a great ringing of bells, and the light from a burning house lighted my room. "Get up! Get up!" my hostess called, "there is a terrible fire. Do not try to save anything but come quickly." Fortunately I had lain down with my clothes on, so that I was ready in a minute, carrying with me my precious box of bees. I found my hostess and her children wrapped in blankets, and we all hurried out into the street. The fire was only a few doors from our house, and with a brisk wind blowing it looked as though nothing could save any house in the village. Some way in the crowd I was separated from Senora Caldero and her family, and I found myself in the middle of the road surrounded by people wailing and crying to the saints. It was a weird moment! The men had formed a chain from the fountain and passed water in every sort of jar and pan, but they worked effectively, and I soon saw that the fire would be conquered. I thought I would be safer in the house, for I did not like being in the midst of that excited crowd, so I crept back into the dark house, still holding jealously my little box of bees,

It was not long before my host came up from the office where he slept, and the family was brought home. There was much embracing and much excited talk, and more wine and whiskey offered to everyone in the good Latin-American fashion, and the daylight was almost upon us before the village became quiet again.

The next morning a horse and a moso were ordered for seven o'clock, and came at eight, the usual custom of the country. Until two o'clock I rode along the river collecting here and there, and enjoying the bright-hued birds, and the beautiful plants. Two plants stand out in the memory of that forenoon; *Antigonon guatemalense* Meissn., a vine with great racemes of most exquisite pink flowers; the other (*Adenocalymna macrocarpum* Donn. Smith?)* a bush with great violet-purple bells, like a glorified pentstemon,

*Capt. Donnell Smith wrote that he was not quite sure of the species of *Adenocalymna*. More material is needed. The plant belongs to the *Bignoniaceæ*.

but with a dreadful odor. The little moso who carried my press could hardly be induced to carry a piece. He made me understand that it would give me diseases unnumbered, but I insisted, and so far not a single disease has resulted.

The plants collected were all kindly identified by Capt. Donnell Smith. The following list of Gualan bees has been prepared by my husband. The new species are in course of publication in the Annals and Magazine of Natural History.

BEES OF GUALAN.

- (1.) *Prosopis quadratifera* n. sp. At flowers of *Iresine paniculata* (L.).
- (2.) *Prosopis gualanica* n. sp. One male.
- (3.) *Halictus hesperus* Smith. 27 females. One at flowers of *Cordia alba*; five at flowers of *Phyllocarpus* n. sp.; the rest at *Vernonia aschenborniana* Schauer, collecting the white pollen.
- (4.) *Halictus townsendi* Ckll. One female, Feb. 23, at flowers of *Tithonia diversifolia* A. Gray.
- (5.) *Augochlora binghami* Ckll. One female.
- (6.) *Augochlora* sp. 1 female.
- (7.) *Augochlora cordiæfloris* Ckll. One female, Feb. 23, at flowers of *Calopogonium cæruleum* Desv.
- (8.) *Agapostemon nasutus* Smith. Seven males, seven females. Six of the males and six females at *Vernonia aschenborniana*; one male at *Calopogonium cæruleum*; one female at *Tithonia diversifolia*.
- (9.) *Agapostemon nasutus gualanensis* n. var. Four males.
- (10.) *Perdita tropicalis* n. sp. At *Cordia alba*.
- (11.) *Centris totonaca* Cresson. One female, "at flowers of yellow vine."
- (12.) *Centris tarsata* Smith. Eleven males. One from flowers of *Iresine paniculata*.
- (13.) *Centris inermis gualanensis* n. subsp. At flowers of *Calopogonium cæruleum*. Also at Quirigua.
- (14.) *Leptergatis toluca* (Cresson). One male at flowers of *Cordia alba*.
- (15.) *Mesoplia azurea guatemalensis* n. subsp. At flowers of *Calopogonium cæruleum*.
- (16.) *Mesocheira bicolor* (Fabr.). Two females.
- (17.) *Exomalopsis callura* n. sp. At flowers of *Vernonia aschenborniana*.
- (18.) *Exomalopsis similis* Cresson. One female at flowers of *Cordia alba*.

- (19.) *Xylocopa wilmattæ gualanensis* n. subsp.
- (20.) *Xylocopa fimbriata molaguensis* n. var.
- (21.) *Xylocopa barbata* (Fabr.). At flowers of *Calopogonium cæruleum*.
- (22.) *Ceratina nautlana* Ckll. One female, at flowers of *Vernonia aschenborniana*.
- (23.) *Ceratina virescens* Friese. One male.
- (24.) *Ceratina regalis* n. sp.
- (25.) *Ceratina xanthostoma* n. sp.
- (26.) *Ceratina xanthostoma rufipennis* n. var.
- (27.) *Coelioxys sanguinosus* n. sp.
- (28.) *Megachile gualanensis*. Both sexes.
- (29.) *Dianthidium gualanense* n. sp.
- (30.) *Euglossa cordata* (L.). One male at flowers of *Arthrostemma fragile* Lindl.
- (31.) *Melipona fulvipes* Guér. One male.
- (32.) *Trigona zexmenia* n. sp. At flowers of *Vernonia aschenborniana*. Also found at Quirigua.
- (33.) *Trigona mellaria* Smith. One at flowers of *Calopogonium cæruleum*.
- (34.) *Trigona cupira* Smith. Twelve workers, eleven at *Vernonia aschenborniana*.
- (35.) *Trigona amalthæa* Oliv. Two workers at *Calopogonium cæruleum*.

All these bees are new to the fauna of Guatemala. The bees recorded from Guatemala up to the beginning of 1912 are : *Halictus providens* Smith, *Augochlora chryseis* Smith, *A. radians* Vachal, *A. nigromarginata* Spinola, *Agapostemon brachycerus* Vachal, *Emphoropsis fulva* (Smith), *Centris clypeata* Friese, *C. labrosa* Friese, *Tetrapedia moesta* Cresson, *T. maura* Cresson, *Bombus lateralis* Smith, *B. unifasciatus* Smith (*mexicanus* Cresson) *Melipona nigripes* Friese, *Trigona fuscipennis* Friese, *T. schulthessi* Friese, *T. flaveola* Friese.

BOOK NOTICE.

WOODLAND IDYLS. By W. S. Blatchley. The Nature Publishing Company, Indianapolis. Price \$1.25, post-paid.

In this little book are recorded the observations and reflections of one who pitched his tent, and spent his summer vacation, apart from the haunts of men, living, in gipsy style, upon squirrels, berries, and other woodland supplies.

The author has contrived, by an unusual construction of his sentences, to give an air of quaintness to his work—as in:—

"The prunella, favourite of my summer blossoms, did I find on yesterday," page 86.

"Tiny the stream, yet this broad valley has it carved," p. 87.

"The writing off my mind, squirrels and marmots do I seek," p. 167.

One passage, at least, in *Woodland Idyls*, will be of interest to entomologists. It is that in which the author tells that he saw an ichneumon light upon a spider, *which a wasp was carrying off*, and deposit an egg in it (pp. 206—9). Does not this afford us a glimpse into the life-histories of such insects as Zabriskie's *prædator*, in Ashmead's genus, *Sphecophagus*?

A few brief quotations from the book under consideration will set the author's style and trend of ideas fairly before the readers of the Canadian Entomologist.

The author's descriptive powers:—

"I saw a skeedoodlum of a wren, his feathers half gone from moulting, his body not bigger than thirty seconds, yet with his head in air he was rolling forth sound enough for a cardinal or other bird ten times his size. 'Cher-whitty—cher-whitty.'" * * * * "A cheery little cuss is he, who would sing were his tail on fire." (p. 42).

"Fuzzy gnats dance in rhythmic mazes before my eyes, while their cousin, a slender reddish-gray mosquito, probes my flesh, I do not feel him until his body is red and gored with my blood. After swatting him the itch begins. Niches they fill in the great scheme of nature. Organs they have for performing all the duties of life. Those duties are but few—to eat, grow and reproduce their kind. Lowly creatures we call them, yet "lowly" only because we esteem ourselves "high." (p. 79).

The author as a botanist:—

"The densely flowered spikes of the vervain before me, some of them two feet in length, have but an inch or two in blossom at a time. The seed pods or fruit of the past are below, the unopened buds of the future above. The flowers are now close to the top, the fruiting portion long, the budding part short, for its season is near the close. Life, present work, is now in the flowering part; duty performed, finished work, in the seed part; promises or hopes for the future in the buds. Only the present blooming part, that which is active, is beautiful. That is the part attractive to the human eye, in the plant as well as in the human. What are you doing? Be up and at work. Live not upon a past reputation. Chance not your happiness upon the budding un-lived future, which may be seared by a night's hoar frost into something dull and dead." (pp. 46-7).

The author as a Darwinian:—

(The Red-headed Woodpecker). "In a century from now the bills of his descendants will be broader, their eyes keener, their throats wider, and they will be part swallow, part woodpecker, creatures better adapted to the life they have adopted. For he is slowly changing from a simon-pure woodpecker, where the struggle for life grows ever more bitter, as the forests grow fewer, into a cleaver of the air, a swallower on the wing, a contortionist who can rise and fall, twist and turn in rapid flight after his oft-times elusive prey." (p. 203).

The author's philosophy:—

"Long may, and doubtless long will, the world wag on without me. My turn at the wheel has ended. Content am I to sit in the shade and practice shooting at a marmot's head." (p. 171).

The author's religious opinions:—

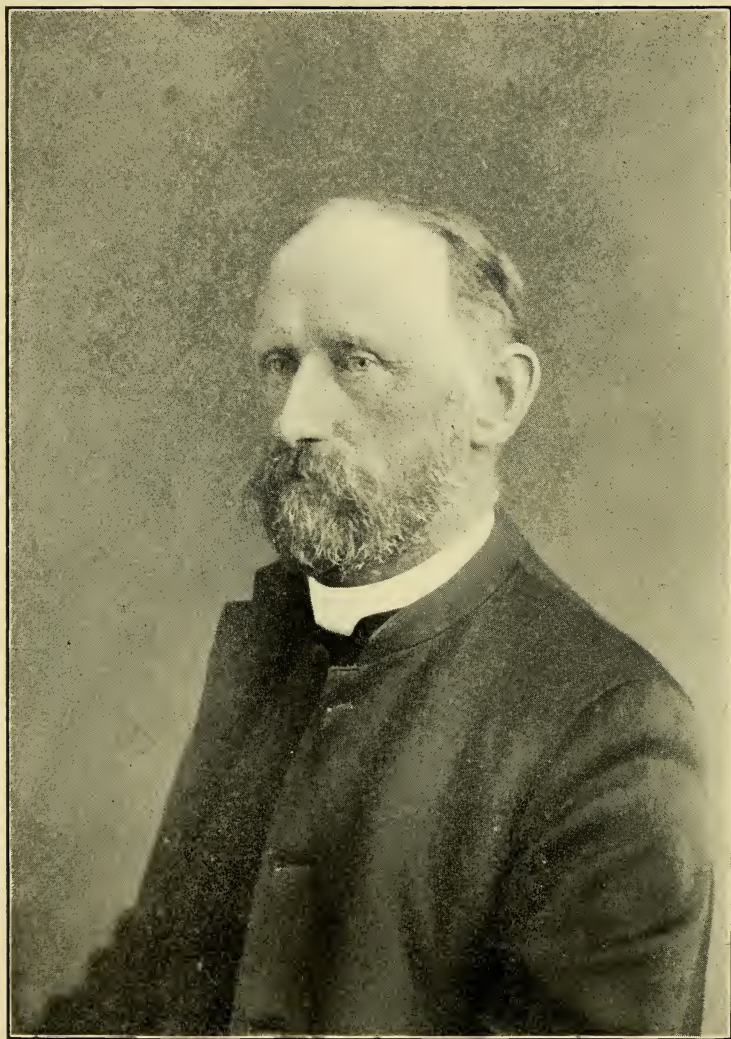
"Great oaks like these were most worthy to be the Gods of the Druids. As much right to worship them had they as I the sun. I revere or worship only that which I *know* exists—that which is the highest, most powerful of all things known to me. Back of or above the sun there may be somewhere—but where we know not, nor shall we ever know—a power higher than the sun, master of him, and of all other suns—the Overlord of all. Until I know, which I shall never do, that there is such an Overlord, until then I worship, if you may call it worship, that highest power, that ruler which my senses ken." * * * * "Then let the oak tree my Sabbath temple be, let the sun be the God unto whom this morn my reverence is due, and this spot of mother earth the altar at which I kneel to do homage unto him." (pp. 228 and 229).

The "God-gifted organ-voice of England," telling of other devotions, breathes a different spirit from that expressed in the last quotation. It says:—

"Thou sun, of this great world both eye and soul,
Acknowledge HIM thy greater; sound His praise
In thy eternal course, both when thou climb'st
And when high noon hast gain'd, and when thou fall'st."
—Adam's Prayer in *Paradise Lost*.

The writer of this article ventures to express an earnest hope that the author of *Woodland Idyls* may attain unto the higher knowledge—the knowledge spoken of by the "MASTER," in His address to His Father Almighty:—"This is life eternal that they might *know* thee the only true God, and Jesus Christ whom thou hast sent."—St. John XVII.: 3.

T. W. F.



REV. G. W. TAYLOR, F.R.S.C.

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THE REV. GEORGE W. TAYLOR, F. R. S. C., F. Z. S.

The subject of this memoir was born in Derby, England, in 1851, and came to Canada when he was twenty-five years of age. He settled in Vancouver Island and studied for the Ministry under the Rt. Rev. George Hills, D. D., Bishop of Columbia. He was made a deacon in 1884 and ordained to the priesthood in 1886. His first clerical charge was Cedar Hill. He had already given attention to the attractive and but little known fauna of the Pacific Coast, for in the preface to the Toronto Check List of Insects, which was published in 1883, Messrs. Brodie and White speak of him as a collector to whom their thanks were due, and at the annual meeting of the Entomological Society of Ontario, held at London, Ont., October 15, 1884, Mr. James Fletcher presented, on behalf of Mr. Taylor, a collection of Diurnal Lepidoptera to the society. On this occasion Mr. Fletcher said that although Mr. Taylor was but a new member "he had already done good work." In the report of this meeting the first contribution, by the Rev. G. W. Taylor, to the annals of the Society, appears. It is entitled "Notes on the Entomology of Vancouver Island." In the CANADIAN ENTOMOLOGIST for the same year (Vol. XVI) other papers written by him will be found.

In 1887, Mr. Taylor was appointed Honorary Provincial Entomologist of British Columbia. In the Annual Report of the Entomological Society for that year he published a very interesting account of a series of expeditions made by himself, Mr. Fletcher, Professor Macoun, Mr. Tolmie and others, to the summit of Mount Finlayson, in search of *Chionobas gigas* Butler.

After some years' active service during which he had built a church, he resigned his charge in Columbia Diocese, and moved to Ottawa. There he was favourably received by the Ecclesiastical authorities; and there he founded the church of St. Barnabas. But after some years, for the benefit of his health, he returned to British Columbia and became rector of the church at Wellington, near Nanaimo. He retained this charge until five years ago when he was appointed by the Federal Government Curator of the Biological Station at Departure Bay.

It was during the period of his second residence in Vancouver Island that Mr. Taylor became a constant contributor to the pages of the CANADIAN ENTOMOLOGIST. In the volumes of that magazine numbered from XXXVI to XLII inclusive no less than eighteen papers from his hand appear. His last contribution, entitled "On some New Species of *Mesoleuca*," is given in the number for March, 1910.

Of late years Mr. Taylor gave much attention to the Geometridæ, especially those belonging to the genera *Eupithecia* Curtis and *Mesoleuca* Hübner. Of these he described and named many new species. The whole of his collection of Geometridæ has been recently purchased by Dr. Wm. Barnes, of Decatur, who, without doubt, will make excellent use of it; but we cannot but regret that so much of the fruit of our late friend's research and ability should have passed from the Dominion.

In 1881 Mr. Taylor was made a Fellow of the Royal Society of Canada. He had been for many years a Fellow of the Zoological and Entomological Societies of England, and fifteen years ago he was elected a Corresponding Member of the Ottawa Field Naturalists' Club. All these societies have been benefitted by his labours.

In the Thirty-fourth Annual Report of our own society appears a highly-appreciative and eulogistic account of Mr. Taylor from the pen of the late Dr. Fletcher. From it we learn that many naturalists have given honour to Mr. Taylor by naming after him new species of various kinds, as, for example: *Melitea taylori* W. H. Edwards, *Mediolaria taylori* Dall, *Leucandra taylori* Lambe.

Undoubtedly Mr. Taylor's chief scientific work was done in connection with Marine Zoology, and in recognition of this the Federal Government, in 1905, appointed him a member of the Dominion Fisheries Commission for British Columbia. In the report of that Commission, Mr. Taylor described as many as thirty kinds of edible shell-fish.

"There is in course of publication by the Dominion Government at the present time a very long and valuable report on the crabs, shrimps, and other crustacea of British Columbia."—(*Ottawa Evening Journal*, Aug. 24th, 1912.)

The following words, written by Dr. Fletcher in the lifetime of Mr. Taylor, and in the paper above referred to, convey much in few words, and were justly due to the deceased: "Mr. Taylor is an indefatigable collector and a generous correspondent, who considers no trouble too much to make observations or secure specimens when specially desired. In his parish work he is painstaking, gentle and self-denying—always ready to help. A clear and forcible preacher and an earnest liver, who shows in his works that religion is not an accessory of every-day life, but an integral part of it."

Mr. Taylor died of paralysis, on August the 22nd last, and was buried in the cemetery at Nanaimo. He leaves to mourn his loss a married daughter and two sons. The funeral service was read by a dear friend of the deceased, the Venerable Archdeacon Scriven.

It is to be hoped that measures will be taken to secure for the benefit of posterity the very valuable conchological and (remaining) entomological collections left by Mr. Taylor.

T. W. F.

ON THE DIPTERA OF BAJA CALIFORNIA, INCLUDING SOME SPECIES FROM ADJACENT REGIONS.—II.*

BY C. H. T. TOWNSEND, LIMA, PERU.

This paper embodies a report on a lot of flies sent me for determination some years ago by the California Academy of Sciences. They were secured on a later expedition than those mentioned in the first paper.† Unless otherwise stated, they were collected jointly by Dr. Gustav Eisen and Mr. Frank H. Vasil, who, together, visited and collected in San José del Cabo in September, and Tepic in October and November, 1894. Species already listed in the first section appear here with their original numbers.

*The present paper has been in manuscript for nearly ten years, but with many others was never reached by the Publication Committee of the California Academy of Sciences, owing to lack of funds. It was returned to me many years ago, has since that time been overlooked, and is now offered on account of the fact that the results it contains appear to have lost none of their interest during the lapse of time.

†Section I appeared in Proc. Cal. Acad. Sci., Ser. 2, Vol. IV, pp. 593-620. October, 1912

BIBIONIDÆ.

2. *Dilophus stygius* Say.

Tepic.—Twelve ♂s and forty-three ♀s, Nov. One pair *in coitu*, which verifies my conclusion that the two sexes associated together in my former determination (see No. 2 of Section I) are the same species. The females vary considerably in size, some being as small as the larger males. The small linear blackish stigma in the whitish wings of the ♂ is often nearly or quite obsolete.

It is worthy of note that, among the specimens sent me of the females of this species, there was inadvertently included a specimen of a black sawfly, which would easily pass for a ♀ *Dilophus stygius* if not looked at a second time. This sawfly is of the same uniform deep shining black as the ♀ *stygius*, is of the same size, and has the same black wings of corresponding shade. I can hardly resist the conclusion that the sawfly mimics the ♀ *stygius*, though for what reason cannot at present be said. The sawfly is a remarkable form, in that it possesses long-branched antennæ. Each antenna is split nearly to base into two branches, the stalk or pedicel being short and bare, and the branches hairy. The abdomen of the sawfly is more shining than that of the ♀ *stygius*, but this does not show save on close inspection, while its general form closely approaches that of the ♀ *stygius* abdomen. Of course, the head of the sawfly is totally different from that of the ♀ *stygius*, but this is not conspicuous on first sight, the effect being lost in the uniform colour resemblance and otherwise close similarity.

D. stygius is an abundant Mexican species. The length of the body in the ♀ does not average over 6 mm. in the present specimens. I believe that the ♀ *Dilophus* identified by Bellardi as *orbatus* Say (Saggio I, p. 19) was not that species, but *stygius* Say. My reasons for this opinion are as follows :

D. stygius was described by Say from Mexico. *D. orbatus* was described by Say from Pennsylvania, and Osten Sacken has identified as *orbatus* two sexes of a species collected in Florida by himself. It is very common for a Middle Atlantic Coast species to extend into Florida, but rarely does a northern species extend so far southwest as Southern Mexico. Bellardi's specimens were from Orizaba. I have myself taken in numbers in the outskirts of Orizaba what I believe to be *stygius*. The males from Florida, which Osten Sacken identifies as *orbatus*, and which I consider to be that species in all probability, are described as having the wings

yellowish, whereas all the Mexican males that I have seen have the wings distinctly whitish with no yellowish tinge. Bellardi gives the length of his specimen (♀) as 8 mm., which is much longer than ♀ *orbatus* as given by Say ($1\frac{1}{5}$ inch = less than 5 mm.), and Wiedemann (2 lines = about 4 mm.). The median cross-vein of the wing is always present in both sexes; it is often situated in both sexes exactly at the furcation of the vein, at other times being just a little distance before the furcation.

62. *Plecia bellardii* Towns., n. nom.

Syn. *vittata* Bell. (nec. Wied.) preocc.

Tepic.—Eight ♂s and three ♀s, Nov. Aside from the genital characters the females may be known by the eyes not being contiguous but well separated, the front being fully as wide as the eyes. Bellardi says that the ♀s are larger than the ♂s, and have the wings longer and wider. In my specimens there is hardly any difference in size of body or wings, except that the abdomen of the ♀ may be slightly larger. Length of body about 7 mm., of wing about 9 mm.

I identify these specimens with Bellardi's (not Wiedemann's) *Plecia vittata*, which Schiner (Nov. Reise Dipt., p. 22), makes a synonym of *plagiata*. I believe that this synonymy is incorrect. If *vittata* Bell. is distinct, as I believe, it must be called by another name, as *vittata* is preoccupied by Wiedemann. I have therefore proposed the name *bellardii*.

There is no brownish tinge to the wings, which vary from a dense to a dilute black, with an iridescent greenish to violet reflection in oblique lights. Wiedemann describes the darker parts of the wings of *plagiata* as blackish brown, Schiner gives no reason whatever for placing *vittata* Bell. as a synonym of *plagiata*.

TABANIDÆ.

63. *Pangonia tepicana* Towns., n. nom.

Syn. *P. basilaris* Wd., Aus. Zweifl., II, 621 (preocc.).

Tepic.—One ♀, Oct. I believe this to be *P. basilaris* Wd., Aus. Zweifl., II, p. 621 (not *basilaris* Wd., Aus. Zweifl., I, pp. 554-5, and not *wiedemanni* Bell., Saggio Ditt. Mess., I, p. 48). Von Röder has pointed out (Dipt. gesam. Süd-Amerika von A. Stübel, p. 7) the differences in the wing coloration of *basilaris* (Wd., Aus. Zw., I, pp. 554-5) and *wiedemanni* Bellardi. In the latter the black of wings is confined to the extreme base, and extends only as far as the cross-veins at base of basal cells. In the former it extends to the cross-veins, closing the basal cells, and takes up the whole basal third of the wing. Röder's specimen of *basilaris* was from the Rio del Cinto (Ecuador), about 5,000 ft.

My specimen agrees perfectly with Wiedemann's description (Aus. Zw., II, 621). It differs markedly, as does also Wiedemann's description, from *P. wiedemanni*, as described by Bellardi. I therefore believe that Bellardi was in error in identifying his species with Wiedemann's. *P. tepicana* differs as follows from Bellardi's description of *wiedemanni*:

♀.—Length, $12\frac{1}{2}$ mm.; proboscis, hardly $3\frac{1}{2}$ mm. Front brownish-yellow pollinose, first two antennal joints light brownish yellow, third wholly reddish yellow, apex not fuscous. Apical annulus elongate, narrow and pointed, hardly half length of rest of third joint. Third joint is swollen at base, but flattened, and the annuli are strongly contiguous. Face brownish-yellow pollinose. Palpi not unusually elongate, last joint about as long as third antennal joint, flattened and curved, but pointed at tip. The palpi and the six lancet-like organs are clear reddish yellow. There are four faint lines apparent on thorax, distinguished from the fuscous-yellow pollinose surface by being more thickly pollinose. Abdomen brownish yellow, first segment black under scutellum, from which a black median vitta extends back to fifth segment (subobsolete for a short distance on third segment in my specimen). Third, and especially fourth and fifth segments tinged with brownish, due to age of specimen no doubt. First two segments with yellowish hair only; third with black hair on anterior two-thirds and yellow hair on posterior one-third; fourth and fifth (these segments are short) with black hair anteriorly, and yellow hair behind, giving the hind border of abdomen a good fringe of yellow hair. Femora blackish, rest of legs wholly orange-yellow, with front femora distally tinged with same colour. Wings tinged with fuscous-yellow, the extreme base blackish brown. All else as in Bellardi's description.

This species will be distinguished at once by the smaller size, shorter proboscis, black femora, and the median abdominal vitta and black hair of third to fifth abdominal segments.

15. *Tabanus punctifer* O. S.

Mesa Verde, L. Cal. One ♀, Oct., 1893 (Eisen).

ASILIDÆ.

21. *Proctacanthus arno* Towns.

San José del Cabo. Four ♀s and seven ♂s, Sept. One of the ♂s measures 33 mm.

22. *Eccritotia amphinome* Walk.

Syn. *Proctacanthus zamon* Towns. (Section I, No. 22).

San José del Cabo. Twenty ♂s and eleven ♀s, Sept. Four of the

♀s and three of ♂s measure 29 to 31 mm. I observed this species at Hermosillo, Sonora, in Sept. 1894, on the sand of the dry bed of the Rio Sonora.

64. *Doryclus distendens* Wd., var. *varipennis* Walk.

San José del Cabo. One ♀, Sept.

Dr. Williston places Walker's species as synonymous with *distendens*, but it may be considered a good variety on the strength of the two brown cross-bands of the wings. This is the first exact record of the species from north of Guatemala.

The present specimen is a strongly aberrant one, with body almost wholly brownish red, front tibiæ and metatarsi not at all blackish; and the fourth posterior cell wide open, being as wide on margin of wing as the first posterior cell. The lateral thoracic vittæ are grayish pollinose, but the two middle vittæ are tawny grayish. The middle vittæ are not elongate cuneiform from a hind view (see O. S., Biol. C. A. Dipt., I, 182), but are distinctly equilateral, well separated and parallel. From a front view they do appear elongate cuneiform. Abdomen is almost wholly brownish red, with only flakes of blackish in places, especially on underside.

Since Jænnicke's figure represents *Doryclus distendens* with the fourth posterior cell completely closed, I infer that this is the normal venation of the genus. Whether the present form should be separated on account of this cell being wide open I cannot now decide. As it otherwise agrees so closely with *Doryclus* in the more important characters, I refer it here.

APIOCERIDÆ.

26. *Rhaphiomidas xanthos* Towns.

San José del Cabo. One ♂, apparently not maturely coloured, seems to be this species. Sept.

Length, nearly 25 mm. This is the only specimen of *Rhaphiomidas* in the lot, which seems strange since so many occurred in the previous sendings. The wings do not quite reach the tip of the abdomen. Segments 6, 7 and 8 of abdomen together about as long as 5, which is but a little shorter than 3. It seems that in the previous description a segment was missed, which is revealed in this less matured specimen.

SYRPHIDÆ.

65. *Chrysogaster bellula* Will.

Tepic.—One ♀, Nov.

Length, 4½ mm. Resembles *intida* in antennæ, which are much

longer than face, and with second and third joints nearly equal in length. The face is not more than three-fifths the length of antennæ. It agrees perfectly in the wings with Williston's description of *bellula*, and not at all with *intida*; therefore I place it here. The antennæ are brown, with first two joints tinged with yellowish. The disk of abdomen is pronouncedly opaque blackish, but with some cupreous and green. The face is quite rugose and the epistoma is hardly produced downwards. I am unable to restore the markings of the eyes, doubtless because the specimen was originally an alcoholic one, and therefore cannot say toward which species it inclines in the pattern of the eye-picture. (See Williston, Biol. C. A. Dipt., III, p. 7.)

66. *Volucella obesa* Fab.

Tepic.—Two specimens, ♂ ♀, Oct.

Length, 10 to 11 mm. Metallic green. The third antennal joint is only moderately short in the ♀, and hardly shorter in the ♂.

67. *Volucella dichroica* G.—Tos.

Tepic.—One ♀ I consider as this species. Oct.

The face is strongly conically projected below, ending in two teeth formed by a median longitudinal notch in the apex of the cone, and I should hardly call it obtuse. The scutellum is not reddish-coppery (*rosso-rame*), but of the same greenish-violaceous colour as the thorax and abdomen. The metatarsi and next two joints, especially in the hind legs, are pale brownish-yellowish, as are also bases of antennæ. Otherwise it agrees well with Giglio-Tos' description. The brownish spot at distal end of submarginal cell is subobsolete, and a similar cloud is apparent on last section of fourth vein at distal end of apical cell, and along last section of third vein. There are bristles on the edge of the scutellum, and the eyes are hairy, both of which characters are unmentioned by Giglio-Tos.

The specimen agrees well with the more important characters in Williston's description of *V. viridis*, from Chapada, Brazil, except that the ♀ front is not of equal width, but is very noticeably widened anteriorly. While the marginal cell is short petiolate, the legs are more luteous than in Giglio-Tos' specimen, yet their prevailing colour is black. In the colour of the scutellum it agrees better with *viridis*, and it possesses the ciliate-like pile of femora and tibiæ. These two species must be very closely allied.

48. *Eristalis tricolor* Jænn.

Tepic.—One ♀, Oct.

Length, $9\frac{1}{2}$ mm. Has much more black on the abdomen than Lower California specimens. The black triangle of second segment expands on each side along posterior margin, widening at posterior corners of segment into a spot. Third segment is black, with a yellow spot on each side, which reaches anterior border only. Narrow hind margin of second to fourth segments light yellow. Tibiæ quite yellowish, even hind pair.

San José del Cabo. One ♀ and three ♂s, Sept. These have more yellow on the abdomen than the above specimen. The ♀ has even the fourth segment yellowish (brownish yellow), with black spot in middle. Second and third segments same. The three ♂s are the same, except that the fourth segment is wholly black in two, and with only the anterior lateral angles yellow in the other.

TWO BEES NEW TO CANADA.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Chelynia ricardonis, n. sp. (? *rubi*, subsp.).

♀.—Length, 9 mm.; similar to *C. rubi* (Ckll.), but sides of head above, and sides and anterior part of mesothorax, with conspicuous white hair; tubercles densely fringed with dull white hair; abdominal markings bright lemon yellow (cream-coloured in *rubi*), the band on first segment broad and entirely curved at sides; that on second interrupted sublaterally, the lateral pieces of it pyriform; third segment with a rather short median stripe and small lateral spots; fourth with a median butterfly-shaped yellow mark; hind basitarsi long, subclavate, with reddish hair on inner side.

Hab.—Vernon, British Columbia, June 19, 1902 (Miss Ricardo). British Museum. This has the structure of *C. rubi* (*betheli* Ashm.), but differs in the colour of the markings and pubescence. It is probably a valid species, but it may prove to represent only a local race or subspecies of *C. rubi*. The latter occurs at Seattle and Olympia, in the State of Washington. Although the two species are not very far apart geographically, Vernon is an inland locality, with doubtless a very different fauna from that of the coast.

Anthidium porterae Ckll.

Calgary, one male (Miss Ricardo). British Museum. Also from Calgary, from some collector, is a male *A. tenuifloræ* Ckll., a form with the scape of the antennæ entirely black.

October, 1912

NEW GENERA AND SPECIES OF XYELIDÆ AND LYDIDÆ.*

BY ALEX D. MACGILLIVRAY, UNIVERSITY OF ILLINOIS, URBANA, ILL.

The most of the following descriptions have been in manuscript for many months. The names in this paper and some others to be published later are to be used in another place, and they are offered for publication at this time for that reason.

Paraxyela, n. gen.—Front wings with the free part of M arising distinctly before the point of separation of R and Sc₂, the free part of R₅ distinctly shorter than R + Sc₂, frequently less than one-half the length of R + Sc₂; the hind wings with the free part of R₅ present; clypeus triangular in outline, the median portion two or three times as long as the lateral portions; the antennæ with the third segment longer than all the following segments together; the claws cleft, the two parts of the cleft parallel. Type, *Xyela tricolor* Nort.

Macroxyela bicolor, n. sp.—Male: head with a flat depressed area in front of the median ocellus, never crossed by the median fovea; median fovea represented by a linear smooth spot only slightly if at all depressed below the surface of the front; the area of the head between the antennal sockets and the ocellar furrow blackish and coarsely punctured, the remainder of the head and the notum finely shagrinèd; antennæ with the third segment five times as long as all the following segments together; the fourth and fifth segments subequal, each longer than any of the following segments; the body black with the clypeus, the labrum, the malar space, the supraclypeal area, the basal plates at sides above the abdomen, and the legs, rufous. Length, 8 mm.

Habitat.—Columbus, Ohio. Professor J. S. Hine, collector.

Differentiated from the males of all other species of the genus known to me by the greater abundance of rufous.

Macroxyela obsoleta, n. sp.—Female: head with a flat depressed area in front of the median ocellus, never crossed by the median fovea; median fovea a broad, flat, indistinct, depressed area, more distinct near the median ocellus; antennæ with the third segment many times longer than all the following segments together, with a black ring at base; the fourth, fifth and sixth segments subequal in length, the following segments shorter; the head below the ocelli sparsely, coarsely punctured; front wings with

*Contribution from the Entomological Laboratory of the University of Illinois, No. 32.

October, 1912

the radial cross-vein much nearer the point of separation of R_2 than the radio-medial cross-vein; the saw-guides strongly convex above on the basal half and straight or slightly convex below; the body rufous with a spot about the ocelli, a spot near the base of each wing, and the base of the abdomen more or less black. Length 8 mm.

Habitat.—Ithaca, N. Y. J. O. Martin, collector.

Similar in appearance to *infusata* Norton, but readily separated by the sculpture of the head.

Macroxyela distincta, n. sp.—Female: head with a flat depressed area in front of the median ocellus, never crossed by the median fovea; median fovea a distinct, narrow, elongate, diamond-shaped depression, flat on the bottom; antennæ with the third segment many times longer than all the following segments together; the fourth, fifth and sixth segments subequal in length, the following segments shorter; the head below the ocelli roughened by elongate punctures; the radial cross-vein nearer the point of separation of R_2 than the radio-medial cross-vein; the saw-guides convex above on the basal half and straight below; the body rufous with two spots on the lateral lobes of the mesonotum, and the postscutellum black. Length 8 mm.

Habitat.—Ithaca, N. Y. J. O. Martin, collector.

The male is black with the clypeus, labrum, legs and venter, except at base, apex, and lateral margin of abdomen for the most part, yellowish-rufous.

Separated from *infusata* Norton and *distincta* Mack by the form of the median fovea.

Protoxyela, n. gen.—Front wings with the free part of M arising distinctly before the point of separation of R and Sc_2 , the free part of R_5 distinctly shorter than $R + Sc_2$, frequently less than one-half the length of this vein; the free part of Sc_2 almost twice as long as the free part of Sc_1 ; Sc_1 much more oblique than Sc_2 ; the cell R_3 usually divided by a supernumerary cross-vein; the hind wings with free part of R_5 present; the clypeus not triangular in outline, the median portion but little if any longer than the lateral portions; the antennæ with the third segment as long as all the following segments together; the claws with an erect tooth at middle. Type, *Xyela ænia* Nort.

Itycorsia angulata, n. sp.—Female: body olivaceous with the basal segments of the antennæ, the clypeal suture, the furrows of the head, the postocellar area in great part, two irregular spots on the posterior orbits,

a crescent-shaped mark on each side on the vertex between the postocellar area and the orbital spot, an irregular band between the dorsal margins of the compound eyes, including the ocelli, the pronotum except the lateral and caudal margin, a spot on the cephalic half of the median lobe of the mesonotum, a spot on each lateral lobe, a round spot on the disk of the mesonotum, the dorsum of the metathorax in great part, the basal plates, the pleural and sternal sutures, and the caudal surfaces of the femoræ, for the most part, black; the median fovea a pit nearer the ocelli than the antennæ, with a tubercle at its ventral end; antennæ with about thirty-five segments, the third segment as long as the next two; the postocellar area broadly convex, higher than the ocelli; mesal eye-margin distinctly angulate; the head sparsely, punctately roughened except the declivous area, which is polished; front wings with the free part of R_5 and the radial cross-vein interstitial. Length 14 mm.

Habitat.—Axtion, N. Y. (C. O. Houghton and the author, collectors); Manchester, Conn. (A. B. Chamberlin, collector); Wallingford, Conn. (J. K. Lewis, collector).

This species is closely allied with *luteomaculata* Cress.

Cephaleia distincta, n. sp.—Male: Body black with the clypeus, the supraclypeal area, the head between the compound eyes and the antennal sockets, a faint spot on each vertical furrow, the posterior orbits, the tegulæ, a band on the mesopleuræ, the prosternum, the legs beyond the coxæ and the lateral margin of the abdomen, yellow; antennæ with about twenty-five segments, the third segment longer than four and five together; the median fovea extending to the median ocellus; the clypeus slightly carinated; the head sparsely punctured, punctures confluent in the region above the antennal sockets; the mesonotum sparsely punctured; the scutellum almost smooth. Length 10 mm.

Habitat.—Mt. Washington, N. H.; Mrs. Annie Trumbull Slosson, collector.

This species would fall in a table near *mathematicus* Kirby, from which it can be differentiated by the black head.

Cephaleia criddlei, n. sp.—Female: body black with the clypeus, a spot on the inner margin of the compound eye, a broad spot on each vertical furrow, the posterior orbits, a long spot on the lateral lobes of the mesonotum including the scutellum and the dorsum of the abdomen, and extending as an angulated band along the lateral margin, rufous; the antennæ beyond the pedicel, and the legs beyond the tip of the femora,

yellowish white; the head deeply, sparsely punctured; the pleuræ and notum deeply, closely punctured; the median fovea indistinct, not connected with the median ocellus; the wings with a dusky band in the region of the stigma. Length 14 mm.

Habitat.—Aweme, Manitoba; Norman Criddle, collector.

This species is similar to *fascipennis* Cresson. The densely banded wings will differentiate it.

Cephaleia jenseni, n. sp.—Female: body rufous with dusky spots on the antennal sockets; median fovea, posterior orbits, postocellar area, the meson of the prothorax and line at sides of the prothorax, a line on the median lobe of the mesonotum, the coxæ and the cephalic and caudal margins of the femora, black; the posterior orbits and the antennæ, white, somewhat rufous at base; median fovea a rounded pit; median ocellus in a rounded depression; the head sparsely punctured; the median lobe of the mesonotum, the shoulders of the lateral lobes and the scutellum, polished; the remainder of the notum sparsely punctured; the third segment of the antennæ longer than the fourth and fifth together; the wing-veins brownish, slightly infuscated along the veins. Length 11 mm.

Habitat.—Eagle Bend, Minnesota. J. P. Jensen, collector.

This species is similar to *criddlei* Mack. It lacks the fuscous banded wings and the form of the median fovea is different.

Pamphilius transversa, n. sp.—Female: body black, with the clypeus, the face, the first segment of the antennæ beneath, the antennæ on its apical third, the cheeks, the posterior orbits, the tegulæ, the scutellum, the legs except the posterior tibiæ, and the abdominal segments three and four and part of five, varying from whitish to yellowish and rufous; the wings hyaline; the veins brownish; the stigma dark; the head finely sparsely punctured; the notum almost smooth, sparsely punctured on the posterior angles; the scutellum roughened; the antennæ with the third segment wider and slightly longer than the fourth; antennæ with about twenty-eight segments; the mesopleuræ finely roughened and setaceous. Length 12 mm.

Habitat.—Franconia, New Hampshire. Mrs. Annie Trumbull Slosson, collector.

This species is similar to *perplexa* Cresson.

Pamphilius dentatus, n. sp.—Body black with the terminal half of the antennæ, the clypeus, a dentate spot on the inner orbits extended as a parenthesis-shaped mark to the caudal aspect of the head; an emarginate

spot in front of the median ocellus and an angular line behind it, a parenthesis-shaped mark at the lateral margin of the vertical furrow, the margin of the pronotum, the tegulæ, the V-spot, the scutellum, the postscutellum, a spot on humeral angle beneath the wings, the front and middle legs and the hind legs except the tibiæ, white; the abdomen rufous beyond the basal plates; antennæ with about twenty-seven segments; supraclypeal area carinated; head depressed about the median ocellus, sparsely punctured; declivous area smooth; median lobe of mesothorax smooth, lateral lobes densely punctured and scutellum sparsely punctured: wings hyaline; veins brownish. Length 8-10 mm.

The male differs in having the entire declivous area yellow and the notum, except the scutellum and the postscutellum, black.

Habitat.—Wilbraham, Mass.—J. O. Martin, collector. Hamden, New Haven, and Wallingford, Connecticut—B. H. Walden, collector.

This species is near *rubi* Rohwer.

Pamphilius fletcheri, n. sp.—Male: body black with the front and clypeus below the transverse ridge, the proximal segment of the antennæ beneath, the apical half of the antennæ, the inner and posterior orbits, a line on each side of the caudal margin of the head, a narrow line on the collar, the tegulæ, the scutellum, the postscutellum, and the legs except the posterior tibiæ, the tarsi becoming more or less rufous, white; abdominal segments three to five rufous; antennæ with about twenty-six segments, the second and third segments equal in length; the declivous part of the head roughened; the median ocellus in a heart-shaped depression, the apex being behind the ocellus, the median fovea a pit below this depressed area; the head strongly elevated and roughened on each side between the lateral ocelli and the compound eyes; the mesonotum polished; the scutellum sparsely punctured; wings hyaline. Length 8 mm.

Female.—Body black, with an anchor-shaped area on the head, the front margin of the clypeus, the mandibles, the distal half of the antennæ, a line on the posterior orbits, the cheeks, the inner orbits, bifurcating near the middle of the compound eyes, one part extending obliquely toward and almost to the lateral ocelli, the other extending along the margin of the compound eyes, swollen at their upper inner margin, narrowed again on the posterior orbits, triangularly expanded at the caudal margin of the head and extending along its caudal margin on each side, two spots in front of the median ocellus, a line on the collar, the tegulæ, two converging bars on the median lobe of the mesonotum, the scutellum, the post-

scutellum, and the legs below the middle of the coxæ, except the distal five-sixths of the posterior tibiæ, white; the abdomen beyond the first segment rufous; the head and mesonotum sparsely punctured; the third segment of the antennæ distinctly longer than the fourth; antennæ with about twenty-four segments; the median foveæ wanting; the median ocellus located in a heart-shaped depression; the frontal declivity broadly and deeply broken by the antennal furrows; wings hyaline, the veins and stigma brown. Length 9 mm.

Habitat.—St. John, New Brunswick.

Described from two males and a female received from Dr. C. Gordon Hewitt, Division of Entomology, Ottawa, Canada, where the type is deposited. These specimens were reared from larvæ received from St. John, New Brunswick. The larvæ feed on the leaves of raspberry (see Annual Report of Experimental Farms for year 1899 (1900), pp. 180-181). The species is named for the late Dr. James Fletcher.

This species is near *rubi* Rohwer and *dentatus*.

SMERINTHUS CERISYI KIRBY AND *SMERINTHUS OPTHALMICUS* BDV.

BY F. H. WOLLEY DOD, MILLARVILLE, ALTA.

It is not very often that I take notes on Sphingidæ, or take much notice of them at all outside my own district; but recent observations casually brought to my notice the fact that two good species were probably involved under the above two names, though I had long ago taken it for granted that such was not the case, and I became immediately interested, and followed the matter up. My first observation in the matter was made while I was somewhat hastily glancing through this family in Mr. Winn's collection at Montreal last January. Thereon I wrote: "Under *cerisyi*, two specimens, Biddeford, Me. and Montreal; have much crenate s. t. lines and apical mark almost lunate as in *geminatus*," and "two from B. C. under *opthalmicus* have lines fairly even, wavy, and apical marks not lunate." Shortly afterwards, whilst in England, I compared this note with Kirby's figure and concluded that it must really represent the form I have so long known as *cerisyi* at Calgary which is the one Mr. Winn has taken on the east coast. Kirby's figure is probably somewhat exaggerated, and has the apical mark almost as lunate, well defined and contracting as *geminatus*. The dark marks near the anal angle of primaries are also more

like those in *geminatus*. These exaggerated characters may of course have been the result of figuring from a specimen with worn margins.

In the British Museum I found a Calgary *cerisyi*, another from Vernon, B. C., and a third from Ashnola, taken by Mrs. Nicholl. Under "Subspecies of *ophthalmicus* Bdv.," I found Butler's type of *vancouverensis* from Vancouver Island, and other specimens from there, Frazer Pines and California, which appeared to agree with it. This is the form which Mr. Winn had as *ophthalmicus*, and is that of which Holland figures a female on Plate VII, Fig. 3, as *cerisyi*. Without having seen Boisduval's type, which, if it still exists, is probably somewhere in France, I must assume that it is the form subsequently described by Butler. All the Calgary specimens at present in my collection are *cerisyi*, and had I even taken *ophthalmicus* here I should probably have noticed the difference. I have a series of the latter from Vancouver and the Island, but no *cerisyi* from outside Alberta, though it evidently occurs right across the continent. Besides the differences mentioned, *ophthalmicus* has the terminal dark shade wider centrally. The two have exactly similar antennal structure, and the only structural difference I can find elsewhere is in the outer margin which has fewer dentations and more acute apices in *ophthalmicus*. I may be in error about their distinctness, and the point requires working out carefully with far more material than I have been able to examine; and, know, for all I may have been so worked out. Holland for instance states that "they run into each other to such an extent as to make it often impossible to distinguish them" and treats them as do most others, as subspecies. Crenations rather than undulations is the rule throughout in *cerisyi*, in lines, apical marks and outer margins, though I feel bound to admit that the variation in my two series is such as to suggest that a large increase of material might result in increased difficulty in separating them. But with closely allied species such is often the case.

European *ocellatus*, of which I have four specimens, resembles *ophthalmicus* rather than *cerisyi*, though the top one of three figures given in Mr. Richard South's "Moths of the British Isles" has the cranate apical marks exactly as in *cerisyi*. The outer margin is more entire than in *ophthalmicus*, and antennal structure is similar to both.

SOME COCCIDÆ FROM THE GRAND CANON, ARIZONA.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Mr. E. Bethel, when recently visiting the Grand Cañon, was so good as to collect some Coccidæ for me, and the species prove so interesting that they are herewith recorded:

1. *Ceroplastes irregularis* Ckll.—In quantity on *Atriplex*, July 22

2. *Orthezia garryæ* Ckll.—On *Fendlera*, July 21. Previously known only on *Garrya*, from a single locality in New Mexico. The following notes are based on the Arizona material:

Pale pea-green; last antennal joint very slender, dark; first joint narrow, bent; legs very long; skin densely spiny as usual.

Measurements in microns: Middle leg, femur and trochanter, 800; tibia, 832; tarsus (without claw), 384.

Antennal joints: (1) 176, (2) 128, (3) 192, (4) 192, (5) 160, (6) 120, (7) 120, (8) 192–208, or counting apical spine, 208–224.

3. *Phenacoccus betheli*, n. sp. (possibly subsp. of *P. cockerelli* King).—On *Amelanchier*, July 21. Adult females solitary on twigs; hemispherical or nearly; about 4 mm. long, $2\frac{3}{4}$ broad, a little over 2 high; dark raspberry-red, covered dorsally with white mealy secretion in small tufts, like a deposit of alkali on the soil, the surface more or less visible between; short, thick irregular marginal tufts. On boiling in KHO, turns the liquid red. Legs and antennæ extremely small, as also are the mouth-parts; legs slender, claws with a very distinct inner tooth.

Measurements in microns: Middle legs, femur and trochanter, 165; tibia, 118; tarsus (without claw), 63.

The same measurements for hind leg are 175, 125, 70.

Antennal joints: (1) 33, (2) 48, (3) 45, (4) 18, (5) 38, (6) 33, (7) 33, (8) 35, (9) 53.

Larva pale yellow, elongate oval, 560μ long and 240μ wide, of the ordinary Pseudococcine type; antennal joints in μ (1) 20, (2) 23, (3) 20, (4) 18, (5) 18, (6) 60.

Related to *P. cockerelli* King, but peculiar for the very short fourth antennal joint, and in spite of the rather large size of the insect, the very small legs. It may be only subspecifically distinct, but no intermediates are known, and it has the aspect of a distinct species. The first three antennal joints are like those of *P. rubivorus*, but not so the others.

October, 1912

A NEW APHID FROM OREGON.*

BY H. F. WILSON, CORVALLIS, OREGON.

Lachnus pseudotsugæ, n. sp.

Stem-mother.—Collected on terminal shoots of *Pseudotsuga douglassii* about Corvallis, Oregon, March 15th, 1911.

General colour light brown with two rows of black spots extending midway along the dorsum to the middle of the abdomen. These spots sometimes join so as to give the appearance of two dark lines extending along the body. Body semi-shining and with faint traces of a light flaky powder on dorsum. Legs and antennæ dusky brown. After having been mounted on slides for some time this species turns red and a deep red colour is assumed by the balsam surrounding them. The abdomen is quite large in comparison with the head and is almost globular. Antennæ VI segmented, and about one-fifth the length of the body. The nectaries are but small round tubes slightly elevated; they are about as wide as long and are situated on the side of the abdomen about two-thirds of the way from the base of the thorax to the base of the cauda. Cauda broad and slightly angled, very short.

Measurements: Length of body, 3.8 mm; width 2.99 mm.. Length of antennal segments, I, .09; II, .09; III, .3; IV, .135; V, .135; VI, .12; spur, .045 mm.; total length, .87 mm. Length of cauda, .3 mm; nectaries, .022 mm.

Spring migrant.—Collected June 4, 1911, on terminal shoots of same host plant. General colour of head and thorax dark or dusky. Abdomen greenish brown, with colouring of white powder. Legs and antennæ, except tarsi and tips of third, fourth, fifth and sixth segments, light brown. Other parts dusky to black. Antennæ about one-fourth the length of the body. Head rounded in front and with a suture or line extending from back to front midway between antennæ. Wings hyaline. The first anal and cubital veins quite distinct while the median with its two branches, remains only as faint lines. The nectaries of this form are cone-shaped with a flanged mouth and are apparently not placed as far forward as in the earlier forms. Cauda short and broadly angular.

*We regret that, owing to a printer's error, which escaped us, the present description of *Lachnus pseudotsugæ* was published in the June number of the Canadian Entomologist (pp. 192) without the name. We therefore republish the description in full with the name added.

Measurements: Length of body, 2.84 mm.; width, 1.09 mm.; length of wing, 3.65 mm.; width, 1.1 mm.; total wing expanse, 8.08 mm. Length of antennal segments, I, .066; II, .11; III, .44; IV, .154; V, .198; VI, .11; spur, .045 mm.; total length, 1.123 mm. Length of nectaries, .064 mm. Length of cauda, .22 mm.

The fall migrant was not secured.

Egg-laying female.—Collected on terminal shoots of above plant, Oct. 30, 1910, and Oct. 27, 1911, along with the alate males. General colour brownish with ash-grey powder on body, and with two more or less regular stripes down the back; and with a wide brown stripe extending across the body from one nectary to the other. At the base and above the cauda another transverse band is usually present. Antennæ and legs, except tips, light brown; other parts dusky to black. Body robust and with large semi-conical nectaries which are brown in colour. Antennæ and legs hairy; antennæ one-third the length of the body.

Measurements: Length of body, 2.9 mm.; width, 1.7 mm. Length of antennal segments, I, .066; II, .09; III, .35; IV, .176; V, .176; VI, .11; spur, .045 mm.; total length, 1.013 mm. Length of nectaries, .06 mm., and cauda, .35 mm.

Alate male.—Collected on terminal shoots of host plant Oct. 30, 1910, and Oct. 27, 1911, about Corvallis, Oregon.

General colour: Head and thorax black with green abdomen. Abdomen with a series of black, transverse, more or less distinct, bands. Antennæ yellow at base, dusky at tip. Femora and tibiæ dusky at middle to black at ends; tarsi black. Wings hyaline but with costa dark brown, median vein and branches almost indistinct; other veins dusky. Nectaries slightly bell-shaped with a flanged opening. Third antennal segment about equal in length to fourth and fifth segments and with about 30 to 39 visible small circular sensoria. Fourth segment with 10 to 12 circular sensoria which appear slightly larger than those on the third segment. Fifth with about eight medium-sized, and one large, visible sensoria at the distal end. Sixth segment with one large and apparently six small sensoria at base of spur.

Measurements: Length of body, 2 mm.; width, .87 mm. Length of wing, 3.87 mm.; width, 1.52 mm.; total expanse, 8.61 mm. Length of antennal segments, I, .066; II, .11; III, .51; IV, .242; V, .3; VI, .154; spur, .066 mm.; total length, 1.448 mm. Length of nectaries, .045 mm.; cauda, .176 mm.

Females along tips of needles, depositing from 5 to 8 eggs.

COLLECTING COLEOPTERA IN A MAINE SAWMILL YARD.

BY C. A. FROST, FRAMINGHAM, MASS.

One of the most prolific and interesting collecting places that I have ever found, is the yard of an old sawmill situated on the banks of the Cochnewagin Stream, below the village of Monmouth, Maine. This mill was a picturesque and weatherbeaten structure as long ago as I can remember, and has been built and in constant operation for at least a hundred years. The logs are hauled into the yard during the winter months and remain there under natural conditions of moisture until they are converted into lumber; thus they do not come in contact with the water for a long period as is usually the case. I have not been able to find many specimens in the yard of a steam sawmill near the lake where the logs remain in the water all the spring.

For several years past, while on my vacations, I have spent many hours collecting on the logs, and the slab and board piles, to the neglect of other localities. During the first hot period of 1909 (June 20 to 26) I collected nearly eight hours each day for three days in this mill-yard and secured over five-hundred specimens, exclusive of a hundred *Monohammus scutellatus* which swarmed in such numbers that I think three hundred more could have been taken.

From June 20 to 25, 1910, fairly hot weather prevailed, but, on account of the previous cool weather and the greatly diminished amount of lumber, the collecting was not as good as in former years. The slab piles below the mill, however, yielded many good things as did the alder bushes and dying trees along the brook.

The following notes, concerning species that have been taken in or near this mill-yard, may be of interest.

The Carabidæ were limited to specimens of *Tachys nanus* and *flavicauda* under bark, and a few specimens of *Pterostichus adoxus* which were hiding under bits of wood near the slab piles beside the brook. *Pterostichus rostratus*, *Chlaenius sericeus*, and several species of *Bembidium* and *Platynus* have also been taken in this locality if not actually in the yard.

The *Staphylinidæ* have been represented thus far by a few bark-haunting species, and one or two others on the flowers of *Viburnum* growing near the logs. On these flowers were taken *Cercus abdominalis* and *Epuræa* sp. representing the *Nitidulidæ*, with *Cryptorhopalum hæmorrhoidale* of the *Dermestidæ*.

Silvanus bidentatus, *Læmophleus biguttatus* and *adustus* were found

under the bark of the slabs, while a fungus growing on an elm log yielded *Cucujus clavipes* and *Tritoma thoracica*.

Hister lecontei, and *coarctatus*, *Plegaderus transversus* and *sayi*, *Teretrius americanus*, and two specimens of *Hister carolinus*, were all the *Histeridae* discovered; all were taken under bark or crawling over the logs.

Of the *Elateridae*, one or two *Alaus oculatus* were found resting on the side of a log as if they had just alighted from a flight; *Adelocera brevicornis* and *obtecta* were taken, the latter always on the board piles. Several *Elater apicatus* were taken on the trunk of a partly dead elm in the daytime, while a single specimen of this species was found on an elm log at the same place by use of a dark lantern. This was the only specimen of Coleoptera (excepting two or three *Magdalis armicollis* which were evidently hiding in crevices in elm bark) that was taken by this method of collecting. Several specimens of *Elater sanguinipennis* were beaten from *Alnus incana* which grows abundantly in the pasture near the mill.

Chalcophora brevicollis Casey was taken quite commonly on the slab piles, while *liberta* was rarely seen. *Dicerca divaricata* was common on the maple cordwood, and *caudata*, a very distinct species, was beaten in numbers from *Alnus incana* sprouts. *D. tuberculata* L. & G. and *chrysea* Mels. (commonly confused with *tenebrosa*) were taken on the slab piles. Fifteen specimens of the latter were found on the trunks of a few fire-injured fir-trees (*Abies balsamea*) from June 20 to 25, 1910. From my observations it seems probable that it breeds in this conifer. It may be noted here that *tuberculata* was taken at Wales, Me., ovipositing in the bark of a healthy twelve-inch hemlock, two or three feet above the ground.

Buprestis sulcicollis was taken once on the logs and once flying near a steam saw-mill about half a mile away. (This species was also taken at South Paris, Me., on slab piles, June 14, 1910.) In previous years single specimens of *B. maculiventris*, *consularis*, and *impedita* Say (commonly called *striata*) have been taken on the logs. It may be recorded that this latter species was taken ovipositing on the stump of a large white pine that had been cut the previous winter. The beetle was hidden by the scarf of the cutting and was laying the eggs in the cut surface of the stump; the date was June 23, 1910. *Poecilonota erecta* L. & G., formerly called *cyanipes* Say, has occurred at Monmouth once or twice. Large numbers of *Melanophila fulvoguttata*, and a few *acuminata* were taken, the former always on hemlock logs. It was also very abundant on hemlock bark in a clearing at Wales, Me. A single specimen of *Anthaxia viridicornis* has been taken.

Chrysobothris dentipes and *scabripennis* were running over the white pine logs in numbers, and there were also a few *femorata* about these logs, but the majority of this species showed a preference for the beech and maple cordwood. *C. trinervia* was taken several times at South Paris, Me., and *azures* has been taken twice on the dead twigs of the beech and willow at Wales, but neither species has yet been seen at Monmouth. *C. sexsignata* has been taken but once, and that emerald gem, *harrisii*, has evaded capture on several occasions.

It was noticed that the species of *Dicerca* and *Chalcophora* could be picked up in the fingers or caught in the hand as they dropped, while the species of *Chrysobothris* were exceedingly lively and it required active use of the net to secure them. The species of *Buprestis* were generally easy to get by brushing into the net, but those of the genus *Melanophila* were active or sluggish according to the temperature. *M. fulvoguttata* has a habit of running around the log and slipping out of reach between it and an adjacent one.

Near the mill-yard *Eupristocerus cogitans* was beaten from *Alnus incanus* sprouts in numbers, on June 22. This species rests on the upper side of the leaf near the centre and slides off over the edge when disturbed; it was unusual to find more than a pair on a single bunch of the bushes.

Large numbers of *Enoclerus quadriguttatus*, together with the variety *rufiventris* Spin., were running over the logs in company with lesser numbers of *Thanasimus dubius*. The former species and variety were seen feeding on adult *Scolytidæ*.

Some, but not all, of the following *Ptinidæ* have been taken in the mill-yard; *Ernobius mollis* and *luteipennis*, *Hadrobregmus carinatus*, *Microbregma emarginatum* Duft., *Trypopitys sericeus*, *Xyletinus fucatus*(?) and *Ptilinus ruficornis*.

The species of *Cerambycidæ* have been nearly as well represented as those of the *Buprestidæ*. Three specimens of *Physocnemum brevilineum* were taken running up the trunk of a decaying elm. A large number of *Orthosoma brunneum* were found hiding under the bark of pine stumps. A dozen or two *Phymatodes dimidiatus* were taken on some spruce logs, which are rarely seen in the yard.

Hiding in the inequalities of the bark of the logs or slabs, *Aseumum moestum* was often found. *Callidium antennatum* and *janthinum*, much more abundant, were often seen perched on the slab piles; this latter species and *Monohammus scutellatus* were much sought after by birds. *Acmaeops proteus*, varying from black to nearly all testaceous, were common

on the piles of newly sawn lumber. *Xylotrechus fuscus* occurred on the logs and board piles at rare intervals, and a specimen was taken on the trunk of a partly dead fir high up among the branches. This specimen has the pubescence of the prothorax and elytra in excellent preservation and clearly shows that *fuscus* is entitled to specific rank. It is undoubtedly, as noted by Col. T. L. Casey (Mem. on the Col. III, p. 359), more nearly allied to *nauticus* than to *undulatus*. *X. colonus* was taken but once.

Neoclytus erythrocephalus was often seen running over ash logs, and a few specimens of *N. muricatus*, so much resembling ants that they may have been unnoticed many times, were taken. The variation in size of these species was strikingly great; specimens at hand measure from five to twelve millimeters in length. It may also be noted here that specimens of *Monohammus scutellatus*, selected from the very large amount of material available at that time, show a variation in each sex of from 13 to 25 mm.

Acanthocinus obsoletus was abundant and almost invisible against the bark of the white pine logs on which they rested. *Ecyrus dasycerus* was beaten from the branches of a dead poplar near the logs, and a single *Purpuricenus humeralis* was once swept from a low bunch of *Salix* near the road.

I have at hand a single example of *Saperda calcarata* of uncertain date but which was undoubtedly bred in the poplars that fringe the high bank between the yard and the pond.

Even now in fancy, I can see the old sawyer as he stood with hand on the lever that controlled the log carriage and watched the saw tear through the huge pine logs. One day he called me, then a small boy, to see "this funny looking bug" pinned on the beam behind him. It was *Saperda calcarata* and the specimen formed the nucleus of a very heterogeneous collection which has, like the old sawyer, long since crumbled into dust.

Saperda obliqua, and the variety of *lateralis* having the post-median cross bar on the elytra, have been beaten from *Alnus incana* on two occasions. A variety of *Oberea tripunctata* Swed. (possibly *amabilis*) has occurred in some numbers on this plant, both at Monmouth and Wales. Variations of *affinis* and *mandarina* have been beaten and swept from bushes. One specimen of *S. vestita* was taken on a board pile in the yard.

One of the rarest and most interesting of the Cerambycidae was taken wandering over the pine needles beneath a huge white pine near the yard. It was *Pachyta rugipennis* and nearly escaped me by its superficial resemblance to *Rhagium lineatum* which is not rare on the logs.

The Chrysomelidæ were not represented except for a number of *Calligrapha scalaris* and larvæ which were swept from the low *Alnus incana* in the pasture.

Tenebrionidæ.—*Alobates pennsylvanica*, *Iphthimus opacus*, *Tenebrio tenebrioides*, *Hypophloeus parallelus*, and *Xylopinus saperdioides* were taken commonly under bark or on the slab piles. *Upis ceramboides* was common, flying and on slabs. One specimen of *Platydemus americanum* was taken. *Arthromacra ænea* was beaten from *Alnus* in large numbers.

Of the Melandryidæ, *Penthe obliquata*, *Synchroa punctata*, *Melandrya striata*, *Phloeotrya liturata*, *Eustrophus bifasciatus*, *Orchesia castanea* were taken on the logs or slabs. *Enchodes sericea* was beaten from the dead branches of a large rock maple, and also found on a log of this tree at Wales, Maine. *Salpingus virescens* and *Pytho planus* were both taken on one occasion under bark or slabs. *Ditylus cæruleus* was captured a few times on the logs and was also seen flying in the daytime. *Dendroides canadensis* and *concolor* were both taken; the former under bark and by beating, the latter by beating maple sprouts in a wood clearing at Wales.

Tomoxia lineella was seen on the trunk of a decayed elm, and a single specimen was captured while unguardedly trying to rid itself of a large mite. Several specimens of this species were taken several years before on a dead tree in the woods.

Hylobius pales was sometimes present in large numbers especially under bits of slabs that had fallen to the ground. *Pachylobius picivorus* was less common, in fact rare. *Pissodes affinis*, *strobi*, and a single *dubius* were taken from the piles of lumber; *affinis* was the most abundant. *Mononychus vulpeculus* was swept from the flowers of the blue iris near the brook.

Large numbers of Scolytidæ were taken flying in the late afternoon. The spruce logs were very badly riddled just beneath the bark by some species of this family. Among those that have been identified are *Dendroctonus valens*, *Hylurgops pinifex*, *Hylesinus aculeatus*, *Xyloterus bivittatus* and *Hylastes cavernosus*.

Taking into account the undetermined species and a few specimens that may be in alcoholic material not yet examined, the number of species taken in and about the mill-yard will not fall much short of 125; many of them which are rare under ordinary conditions are here abundant, while excessively rare species appear with gratifying frequency. If it were possible to collect in this yard frequently from June 1st to August 15th, I feel sure that the results would be surprising. Any collector who can visit a place where lumbering operations are carried on, even on a moderate scale, will be amply repaid.

OBSERVATIONS ON THE LIGHT-EMISSION OF AMERICAN LAMPYRIDÆ.—FOURTH PAPER.

BY F. ALEX. MCDERMOTT, PITTSBURG, PA.

In continuation of his former observations on the light-emission of American Lampyridæ and its relation to the sexual life of the insects (CAN. ENT., 1910, Vol. 42, pp. 357-363; 1911, Vol. 43, pp. 399-406; 1912, Vol. 44, p. 73), the writer has made during 1912 the observations recorded below on species of Lampyridæ not heretofore encountered by him, which support his former observations and show specific distinctions which are of interest. About the time of the publication of the second paper of this series, Dr. S. O. Mast, of Johns Hopkins University, read the a paper embracing very similar observations on (probably) *Photinus ardens* Lec. and emphasizing the bearing of the behaviour of these insects on the theory of phototactic orientation (Abstract in Science, 1912, Vol. 35, p. 460.)

Photinus marginellus Lec.—This species was first observed in Ashland, Ohio, during the latter part of June. In the late afternoon, several hours before sunset, both sexes were found in flight and resting on the leaves of low plants. As mentioned by Leconte, the male greatly resembles *P. scintillans* while the female, instead of being apterous as in the latter species, has wings and elytra as fully developed as those of the male. The flash of the male is a single, short, sharp one, and in colour appears to the eye more yellowish than that of *scintillans*, though resembling that of the male of the latter species in intensity and manner of delivery. The flash of the female *marginellus*, however, differs distinctly from that of the female *scintillans*; instead of being a single flash, somewhat slower than that of the male, as in *scintillans*, the flash of the female *marginellus* consists of two coruscations, the first being brighter and of shorter duration than the second, which follows the first immediately. The flash of the female is delivered with only a very short interval after the flash of the male she is answering. It will be noticed that this double flash of the female *marginellus* differs decidedly from the double flash of the male of *P. consanguineus* previously described.

*Photinus castus** Lec.—This species was found during June and July in open places, particularly in Schenley Park in Pittsburg, Pa.

*See following footnote.

October, 1912

As with *scintillans* and *marginellus*, the flash of the male is a single, short, bright scintillation. The males of *castus* and *marginellus* were frequently found flying together over the same plot of ground, and it proved quite easy to distinguish them by the characteristics of their light-emission. The flash of the male *marginellus* is decidedly shorter and more sudden than that of the male *castus*. *P. scintillans* was not observed at this time, and hence could not be compared.

The female *castus* has the wings and elytra fully developed, but like *marginellus* female, flies but little. The flash of the female *castus* is very much like that of the female *scintillans*—a single, short scintillation, slightly more prolonged than that of the male, somewhat less intense, and with no indication of doubling (difference from *P. marginellus* ♂). It is delivered immediately after the flash of the male answered, without any distinct pause.

The mating process in both *P. marginellus* and *P. castus* is exactly the same as described for *P. pyralis* and *P. scintillans*, and needs no further comment. The females of *marginellus* and *castus* will not answer with any certainty the flare of a match; in fact, in a large number of trials, only one distinct answer, from *P. castus* ♂ was observed. As in the other species of *Photinini* heretofore observed, the females of these two species are much less numerous than the males, and with *marginellus* the writer observed for the first time among our Lampyrids the attempted coupling between males, reported by Oliver (Ier. Cong. Internat. d'Entomol., Brux., 1910, pp. 143-144). While the females of both species fly readily they are comparatively rarely found in flight, preferring to creep to the tips of blades of grass, upper edges of leaves, etc., where they remain until mated. As in the species of *Photinus* previously described, the luminous apparatus of the males of both *castus* and *marginellus* covers the entire ventral surfaces of the 5th and 6th abdominal segments, and a good portion of the 4th, while the organ of the female consists of a small rectangular spot on the 5th abdominal segment; in both species the eyes and antennæ of the male are somewhat larger than those of the female.

Where the males of both species were seen flying over the same area, careful watching showed the presence of the females of both species in the vegetation. Although especially watched for, no case of interbreeding was encountered, and indeed no case of approach between the sexes of the different species. In both species, flying males have been seen to respond (apparently) to males of the same species in the vegetation. In both of these species one will frequently find a pair in copula, surrounded by several

more males ; at first this suggests that a specific odor may also play a part in the attraction, but the observations of Mast (ante) are opposed to this view, as are also those of Emery (see the writer's second paper). The presence of these extra males is probably accounted for by the attraction of several males before actual mating, as females of *Photinus* do not appear to flash while coupled, unless disturbed.

P. marginellus and *P. castus* also differ in their conduct in the late evening ; *marginellus* ♂ continues to flit around the vegetation for a long time, thus resembling *P. scintillans*, while the *castus* ♂ flies aimlessly high above the vegetation after the time of maximum activity, thus more closely resembling the habit of *P. pyralis*.

Rileya (Lucidota) atra* Oliv.—The first specimen of this species taken this year was a larva, found in a decayed stump at Niagara Falls, N. Y., on May 6th. This glow-worm was kept alive and subsequently developed, the imago proving to be this species. The adult was but faintly luminous, and for only a very little while after emergence, and no excitation produced light-emission during the remainder of the time (about a week) that it was kept alive. Subsequently several adults of this species were taken in flight in the daytime in July, near Sharpsburg, Pa., and in no instance was there any indication of luminosity. All specimens taken were apparently males. The luminous apparatus of the adult is represented by two small brownish scales on the last segment of the abdomen ; the larva was quite as luminous as that of *Photinus pyralis*, which it much resembled. The reared adult, with its larval and pupal skins, is deposited in the U. S. National Museum.

Rileya (Lucidota) punctata Lec.—This species closely resembles the foregoing, but is only about 3/5 as long. Both sexes were taken in flight in the daytime, in woods near Sharpsburg, in July, and neither showed any indication of luminosity, although the brownish scales representing the luminous apparatus were present, as in *R. atra*. In this species the eyes of the male are larger and the antennæ longer than in the female.

Lecontea angulata Say.—Numerous males of this species were observed at Canajoharie, N. Y., on June 28th, flitting about over the flats on the south bank of the Mohawk River, in a manner very similar to that described last year for *L. lucifera*. As the time available for observation was very brief, no females were found.

*Ern. Olivier (Revue scient. du Bourb. et du cent. de la France, 1911-12) has recently segregated these two species, giving them the generic name *Rileya*.

A NOTE ON *PHOTINUS CASTUS* LEC.

BY F. ALEX. MCDERMOTT, PITTSBURG, PA.

During the course of the observations recorded in the preceding paper, it became evident to the author that the insects usually classified as *Photinus marginellus* and *Photinus marginellus* var. *castus*, are actually distinct species. As brought out in the foregoing paper, the manner of the light-emission of the males of the two differ somewhat, and that of the females very distinctly. Such distinctions among the Lampyridæ cannot be other than specific, especially in view of the very close resemblance which many of the known distinct species bear to one another, and while a definite boundary between species and varieties, which is satisfactory to everyone, has not been established, and possibly never will be, it still seems proper to consider that when a Lampyrid shows such differences from other forms in its manner of light-emission as to almost preclude the possibility of interbreeding, it is due the position of a distinct species.

LeConte established the species "*Photinus casta*" for an insect from Georgia, U. S. A., in the same paper in which he established "*P. marginella*" for specimens from Missouri and elsewhere. (Proc. Acad. Nat. Sciences, Phila., 1851, p. 335.) Subsequently he appears to have abandoned this arrangement, and grouped the "*casta*" as a variety of "*marginella*," and in his List of the Coleoptera of North America (Miscellaneous Collections of the Smithsonian Institution, No. 140, p. 51, 1866), he gives *Photinus marginellus* var. *castus*; this is the earliest reference to the change in the classification of this insect which I have been able to locate. The insect is thus listed as a variety of *marginellus* in the Genminger-Harold Catalogue (Vol. 6, p. 1,643), and in Ern. Olivier's recent lists (Wytzman's Genera Insectorum, Fasc. 43; Schenkling-Junk Catalogus Coleopterorum, Pars 9).

In view of the specific differences in light-emission, above referred to, it has seemed best to re-establish the species under LeConte's (corrected) name. The species differs from the other species heretofore described in these papers, most particularly in the pale gray colour of the elytra; by transmitted light the latter appear to be almost pigmentless, except at the margins; the central black spot on the disc of the thorax is small and more frequently wanting than in the true *marginellus*; the insects average somewhat larger than either *P. marginellus* or *P. scintillans*, but are distinctly smaller than *P. consanguineus*.

The writer is indebted to Dr. Samuel Henshaw for his kindness in comparing specimens sent him with LeConte's types in the Museum of Comparative Zoology.

BOOK NOTICES.

ELEMENTARY ENTOMOLOGY, by E. Dwight Sanderson and C. F. Jackson, Ginn and Co., Boston. Price \$2.00.

The appearance of this work so soon after the senior author's excellent book on "Insect Pests of Farm, Garden and Orchard" comes as a surprise but a very welcome surprise to students of entomology. The book is intended primarily as a text book for short courses in entomology, but covers the systematic side of the work so well that it will probably be used by many teachers for all but their most advanced classes.

The book contains three hundred and seventy-two pages with four hundred and ninety-six illustrations of a very superior character. It is divided into three main divisions. Part I, consisting of sixty-six pages, deals with the structure and growth of insects. A few pages of this section are given to a description of the differences between insects and closely allied invertebrates; the remainder is devoted to a concise and clear account of the external and internal anatomy of insects, and to their growth and transformations, the latter being illustrated by the life history of a few common species. The section throughout shows abundant evidence of skilful handling of a somewhat difficult subject. The only criticism that suggests itself is that instead of taking two examples of complete metamorphosis from Lepidoptera, it might have been better to have chosen one of these from some other order. However, this is a minor point.

Part II, which contains two hundred and two pages, deals with the classes of insects. For convenience these have been divided into nine groups: Aptera, Orthoptera, Neuroptera and Pseudoneuroptera, Platyptera, Hemiptera, Coleoptera, Lepidoptera, Diptera, and Hymenoptera. The various orders which have been put into one group, such as, for instance, the Neuroptera and Pseudoneuroptera, are mentioned and their characteristics briefly given. In each order a large percentage of the families are described, those of economic importance being given the preference. In bringing out the characteristics of the different families, copious illustrations have been used. One can scarcely give this side of the work too much credit as the photographs and drawings are not only excellent works of art in themselves but in a very large proportion of cases show the different stages in the life history of the insect described and thus enable the student to understand and remember them much better.

By conciseness of language and the use of illustrations the senior author, who is responsible for parts I and II, has succeeded remarkably well in giving a good general view of all the orders. About three hundred different species of insects have been described and illustrated in this section.

Part III, consisting of almost one hundred pages, is devoted to laboratory exercises and outlines a fairly comprehensive course of study of the external and internal anatomy of types of the more common and important orders, giving special attention to a comparative study of the mouth-parts. Hints are also given on the proper methods of studying life histories. One of the most useful chapters in this division of the book consists of a series of keys to the various orders and families. Most of the keys are simple and easy to use, being based on characteristics that can readily be seen with a hand lens. In the case of the Lepidoptera and Diptera it was of course found necessary to use the wing venation in constructing a satisfactory key. In doing so the author has inserted diagrams of wings of most of the families included in the keys to these two orders. It is doubtful, however, whether it would not have been an improvement to have devoted a short chapter of four or five pages to a study of wing venation and the method of clearing wings of the Lepidoptera.

The remainder of part III outlines methods of collecting, preserving and studying insects, and many suggestions are given that will be helpful to all but the most experienced entomologist. This part does much to remedy a long-felt defect in entomological text books and will help greatly to give the book a wide circulation among students and teachers of entomology.

As is usual in a work of this character, there are a few errors of minor importance, chiefly of a typographical character. Promethia (page 216), Velidæ (page 309) and Physopodæ (page 308) are clearly cases of this nature. In part II (page 116) Negro Bugs are classed as Corimelænidæ and in the key as Thyreocoridæ. *Æcanthus niveus* (page 87) should clearly be *O. nigricornis*. On page 161 it is stated that "the lady bird beetles form the only family of the Trimeræ. This is rather misleading, as is also the statement on page 75 that springtails "are never injurious." These, however, are insignificant mistakes and do almost nothing to lessen the value of the book.

L. CÆSAR, O. A. C., Guelph, Ont.

THE FUNGUS GNATS OF NORTH AMERICA. By Oskar A. Johannsen, Ph.D. Parts I-IV, from Bulletins 172, 180, 196 and 200. Maine Agricultural Experiment Station, Orono, Me.

The concluding part of this admirable work was issued in June of the present year, the first part having appeared in Dec., 1909, and the second and third parts in June, 1910, and Dec., 1911, respectively. It is a work of 306 pages, whose aim is to "present a synopsis of the fungus gnats, or Mycetophilidæ, of North America, giving descriptions of and tables to all the genera and species and life-histories when known." On account of their small size and unattractive appearance, these flies have hitherto received little attention from systematic entomologists, so that the preparation of the keys and descriptions of the 82 genera and 428 species must have been a task of unusual difficulty, demanding an exceptional amount of patience and industry on the part of the author, who is therefore the more to be congratulated upon his having so successfully accomplished it.

In the first part the general characters of the family in their various stages are discussed, special attention being given to the venation and the form of the hypopygium of the male. There is also a short discussion of the habits and economic relations of the groups as a whole and an analytical key to the eight subfamilies. The remainder of Part I is devoted to the systematic treatment of the first five subfamilies (Bolitophilinæ, Mycetobiinæ, Diadocidiinæ, Ceroplatinæ and Macrocerinæ), all of which are comparatively small groups. Fifteen genera and 71 species, of which 11 are new, are described in this part.

Part II deals with the Sciophilinæ, and includes a short account of their habits and earlier stages, in addition to the tables and descriptions. Twenty-nine of the 69 species described in this part are new, most of these belonging to the two largest genera, Sciophila and Mycomya.

Parts III and IV treat of the Mycetophilinæ and Sciarinæ, the two groups of the most economic importance. The former is the largest of the subfamilies, embracing 48 genera and 110 species, of which 54 are described as new. In the Sciarinæ 9 genera and 56 species are described, 46 of the latter belong to Sciara, including 22 new species.

In all the tables the venational characters take the most prominent place, but many others are also employed, such as the position of the ocelli, structure of the palpi and antennæ, and particularly that of the hypopygium of the male. There is considerable variation in the length of the descriptions, some of the diagnoses of new species being only four lines in length, while others occupy 20 lines or more. The descriptions are supplemented by a series of tables giving the relative measurements of the various joints of the legs. There is also an index to the genera and a series of well executed plates, mostly in half-tone, illustrating structural features, chiefly the wings and the hypopygia of the males. It is not quite clear why the plates have not been numbered.

THE Canadian national collections in the Victoria Memorial Museum at Ottawa should be the results of efforts to increase knowledge and the exhibit should be made in a manner to diffuse knowledge. They should not be collections of curios. All Canadians, especially educators, will be interested to make use of the collections often, and should direct others to do so as well as students. It is hoped that time may dispel rapidly the idea, which unfortunately too many people have, that the place is a store-house for curiosities or abnormal and monstrous things rather than that it is an institution of learning. Some of the staff will always be glad to meet classes or visitors and to give them such assistance as is possible. Pending the completion of the lecture hall, informal talks in the laboratories or offices may occasionally be arranged, especially if a few days' notice is given. As time goes on, the institution will probably be able to loan pictures, lantern slides, maps, labels, casts, and even specimens for educational purposes,

HARLAN I. SMITH.

CHANGE OF NAME.—Dr. Brölemann has called my attention to the fact that my genus *Poabius* is preoccupied by *Poabius* of C. L. Koch. It may be replaced by *Pokabius*.—R. V. CHAMBERLIN.

CORRECTIONS.—In my last paper on the genus *Hydriomena* (CAN. ENT., XLIV, Aug., 1912) the following corrections should be made:—P. 225, lines 16, 17 and 19, for "*Bockhausen*" read "*Borkhausen*." P. 226, line 12, for *Thmb.* read *Thunb.* P. 229, No. 11, and p. 230, No. 11, for "*lanavahrata*" read *banavahrata*. P. 230, line 11, for "(d) *Mesial lines smutty*" read "(d) *Mesial space smutty*."

L. W. SWETT.

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SYNONYMY OF THE PROVANCHER COLLECTION OF HEMIPTERA.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

Through the kindness of Rev. A. Huard, of Quebec, I recently had an opportunity to examine the Provancher collection of Hemiptera now deposited in the Museum of Public Instruction in the Parliament Buildings in that city. This collection has been well cared for and is in excellent state of preservation. The main part of the collection seems to represent the exact material used by the Abbé in the preparation of the Hemiptera volume of his *Petite Faune Entomologique du Canada*, practically all the species included in that volume being in the collection in the same order as in the book; the few additional species being in most cases placed between the regular rows of the arrangement. Usually there is but one or at most two specimens of each species and the labels seem to be in Provancher's own handwriting. There are no "types" so indicated nor could I find any trace of the types of his species published in 1872 in Vol. IV of the *NATURALISTE CANADIEN*, and I am convinced that he incorporated this material with his general collection at the time he published the *Petite Faune*, or so much of it as he then possessed, and consequently that it will be impossible definitely to locate all of his earlier species. The *Petite Faune* collection however contains Provancher's determination of most of his 1872 species and so far as these specimens agree with his first descriptions they must be taken as representing the nearest approximation to types of his earlier species now in existence.

When starting for Quebec I took with me a good series from my own collection for comparison, covering all the species of which I felt in doubt, and by this means I was enabled to locate nearly all of the species in the *Petite Faune* and most of those of 1872.

In the following notes I have thought it best to give my determination of each of the *Petite Faune* species, indicating all uncertain forms where I had no material with me for direct comparison and so was obliged to depend upon my memory for the determination. Under each species I give first the page in the *Petite Faune*, followed by the name as there

printed. Where the determination is correct this word follows the name and after it is the name now used for the species where it differs from that employed by Provancher.

20. *Thyreocoris unicolor* P. B., correct.
21. *Thyreocoris pulicarius* Germ., correct.
21. *Homæmus æneifrons* Say, correct.
22. *Eurygaster alternatus* Say, correct.
27. *Canthophorus cinctus* P. B., correct. *Sehirus cinctus* P. B.
28. *Pangæus bilineatus* Say, correct.
29. *Podisus cynicus* Say, correct. *Apateticus cynicus* Say.
30. *Podisus modestus* Dall. Under this name is one *Podisus sereiventris* Uhl. pinned to the label and one *modestus* at the side.
31. *Podisus spinosus* Dall., correct. *Podisus maculiventris* Say.
32. *Perillus circumcinctus* Stal, correct. *Perilloides circumcinctus* Stal.
33. *Perillus exaptus* Say, correct. *Perilloides exaptus* Say.
34. *Rhacognathus americanus* Stal., not in the collection.
35. *Brochymena annulata* Fabr. is *4-pustulata* Fabr. (Under the name *4-pustulata* Fabr. is one example of *myops* Stal.)
36. *Euschistus fissilis* Uhler, correct.
36. *Euschistus tristigmus* Say, correct.
38. *Aelia americana* Dall., is *Neottiglossa undata* Say; a dark specimen but not as dark as the western *trilineata* Kirby.
39. *Neottiglossa undata* Say, correct; a pale example. (In the collection is a western specimen of *Thyanta antiguensis* Westw., labelled *Neottiglossa sulcifrons*.)
40. *Hymenarcys nervosa* Say, correct.
40. *Cœnus delius* Say, correct.
41. *Lioderma ligata* Say is *Pentatoma persimilis* Horvath.
42. *Thyana custator* Fabr., correct.
43. *Mormidea lugens* Fabr., correct.
44. *Cosmopepla carnifex* Fabr., correct.
46. *Banasa calva* Say; under this name is a pale example of *dimidiata* Say.
46. *Banasa dimidiata* Say, correct.
46. *Banasa euchlora* Stal, not in the collection.
48. *Acanthosoma cruciata* Say. On this label is an example of *Elasmotethus atricornis* Van D., and by it one of *E. cruciata* Say.

In this collection are the following erroneous determinations: *Thyanta custator* labelled *Trichopepla atricornis* Stal.; *Euschistus servus* Say labelled *E. impictiventris* Stal.; *E. fissilis* Uhler labelled *E. variolarius* P. B.; *Apateticus bracteatus* Fh. labelled *Podisus grandis* Dallas; and *Perilloides exaptus* Say labelled *Perillus splendens* Uhler.

53. *Anasa tristis* De G., correct.

55. *Chelinidea vittigera* Uhler. Under this name is one example of *vittigera* Uhler and one of *tabulata* Burm. Judging from the description the former must have been the one stated to have been taken in Quebec.

55. *Alydus eurinus* Say, correct.

56. *Alydus 5-spinosus* Say, correct.

56. *Alydus pluto* Uhler. Under this name are two females of *eurinus* Say.

57. *Tetrarhinus quebecensis* Prov., is *Protenor belfragei* Hagl. In the collection it stands under the correct name showing that Provancher must have corrected his own determination later.

58. *Capys muticus* Say, correct. *Neides muticus* Say.

58. *Jalysus spinosus* Say, correct.

60. *Corizus punctiventris* Dall, correct. *Stictopleurus crassicornis* Linn.

60. *Corizus lateralis* Say, is *nigristernum* Sign. as usually determined.

61. *Harmostes fraterculus* Say. On this label is an example of *Ortholomus longiceps* Stal.

The following are incorrectly determined; *Ceraleptus* sp. determined as *Orsillus scolopax* Say; *Metapodius terminalis* Dall. as *Anisoscelis corculus* Say; *Metapodius femorata* Fabr. as *Anisoscelis declivis* Say; and *Harmostes reflexulus*, pink form, as *H. serratus* Fabr.

69. *Lygæus bistriangularis* Say, correct.

70. *Lygæus turcicus* Fabr. is *L. kalmii* Stal.

70. *Nysius grænländicus* Zett, is *N. thymii* Zett.

71. *Helonotus abbreviatus* Uhl., correct. *Phlégyas abbreviatus* Uhl.

72. *Cymus tabidus* Stal is *Cymus discors* Horv.

73. *Ædancala crassimana* Fabr. is *O. dorsalis* Say.

74. *Ischnorhynchus didymus* Zett., correct. *I. resedæ* Panz.

75. *Oxycarenus disconotus* Say, correct. *Crophius disconotus* Say.

75. *Ischnodemus falicus* Say is *Peritrechus fraternus* Uhler.

76. *Blissus leucopterus* Say, correct.

77. *Emblethis arenarius* Linn. is *E. vicarius* Horv.

77. *Plociomerus nodosus* Say is *Scolopostethus* sp., probably *diffidens* Horv.

78. *Carpilis ferruginea* Stal, correct.
 79. *Ligyrocoris constrictus* Say, correct. *Perigenes constrictus* Say.
 80. *Heræus insignis* Uhl. is not in the collection.
 81. *Eremocoris ferus* Say, correct.
 82. *Trapezonotus nebulosus* Fall., correct.
 82. *Pamera bilobata* Say is *Ligyrocoris contractus* Say.

84. *Pterometus canadensis* n. sp. This is the species lately described as *Pseudocnemodus brunneri* by Mr. Barber and must be known as *Pseudocnemodus canadensis* Prov. The following are incorrectly determined: *Oncopeltus fasciatus* Dallas determined as *Lygæus gutta* H. S.; and *Dysdercus mimus* Say as *Lygæus pulchellus* H. S. *Geocoris limbatus* Stal is correctly named. Under the name *Cnemodus mavortius* is an example of the larger dark form which I now consider to be distinct.

85. *Geocoris bullatus* Say, correct.

89. *Anthocoris musculus* Say. This is *A. borealis* Dallas which is probably a synonym of *musculus* Say.

90. *Tetraphleps canadensis* n. sp., correct. *Lytocoris canadensis* Prov.

91. *Triphleps insidiosus* Say, correct.
 102. *Collaria meilleuri* Prov., correct.
 103. *Collaria oculata* Reut., correct.
 103. *Miris instabilis* Uhler, correct. *Stenodema instabilis* Uhler.
 104. *Trigonotylus ruficornis* Fall., correct.
 104. *Trigonotylus pulcher* Reut., correct.
 104. *Leptopterna dolabrata* Linn., correct. *Miris dolabrata* Linn.
 106. *Resthenia insignis* Say. Under this name is the black form with the pronotal collar only fulvous. It pertains to Reuter's genus *Platytylællus*.

NOTE — Under the name *Resthenia nigricollis* is a large black *Lopidea*, and under the name *Resthenia maculicollis* stands *Lopidea confluens* Say. There is also an *Orthotylus congrex* Uhler under the name *Lomatopleura caesar* Reut., but this placing must have been an accident.

106. *Lopidea confluens* Say, correct.
 108. *Phytocoris scrupæus* Say is *P. lasiomerus* Reut.
 108. *Phytocoris pallicornis* Reut. is *P. tibialis* Reut.
 109. *Phytocoris eximius* Reut., correct.
 110. *Phytocoris inops* Uhler, correct.
 111. *Neurocolpus nubilus* Say, correct.
 112. *Compsoecocoris annulicornis* Reut. This is not Reuter's species but a large dark coloured *Phytocoris* of the *eximius* group, perhaps still

undescribed. I have taken the same form about Buffalo and Mr. Moore has sent me specimens taken by him at St. Hilaire, Que.

113. *Calocoris rapidus* Say, correct. *Adelphocoris rapidus* Say.

114. *Calocoris bipunctatus* Fabr., correct.

114. *Pycnopterna amæna* n. sp. This is the *Closterocoris ornata* Uhler and must hereafter be known as *Closterocoris amæna* Prov. Its occurrence at Ottawa, if really taken there, was probably accidental. Its range seems to be restricted to the Pacific region.

116. *Camptobrochis grandis* Uhler, correct.

116. *Camptobrochis nebulosus* Uhler, correct.

118. *Coccobaphes sanguinarius* Uhler, correct.

119. *Lygus pratensis* Linn. is *L. convexicollis* Reut.

120. *Lygus flavonotatus* Prov. is *L. pratensis* Linn., var. *lineolaris* P.B.

120. *Lygus belfragei* Reut. is the red variety of *L. pratensis* Linn.

121. *Lygus invitus* Say. Pinned on this label is a *Lygus tenellus* Van D., and next to it is a *L. invitus* Say.

121. *Lygus contaminatus* Fall. is *L. pabulinus* Linn.

122. *Pæcilocapsus lineatus* Fabr., correct.

123. *Pæcilocapsus affinis* Reut., correct. *Horcias dislocatus affinis* Reut.

123. *Pæcilocapsus marginalis* Reut. I did not find this in the collection, but the determination is undoubtedly correct.

123. *Pæcilocapsus goniphorus* Say, correct. *Horcias dislocatus goniphorus* Say. With this specimen is pinned an example of var. *nigrita* Reut. of the same species.

124. *Orthops scutellatus* Uhler is *Tropidosteptes amænus* Reut., var. *palmeri* Reut.

125. *Systratiotus venaticus* Uhler, correct. *Pæciloscytus venaticus* Uhler.

127. *Pamerochoris brunneus* Prov. On this label is pinned an example of *Plagiognathus politus* Uhler, but as it does not agree at all well with Provancher's description of 1872 I am inclined to think that the type specimen was lost and the present one substituted by error.

127. *Pæciloscytus sericeus* Uhler. On this label is an *Orthotylus flavosparsus* Fall.

128. *Pæciloscytus basalis* Reut. On this label is a *Sthenarops malinus*. Neither this nor the preceding specimens agree with the descriptions in the Petite Faune and may have been placed there by mistake.

129. *Capsus ater* Fieb., correct. Authority should have been *Linnaeus*
130. *Monolocoris filicis* Linn., correct.
131. *Pilophorus bifasciatus* Fabr. is *P. clavatus* Linn.
132. *Stiphrosoma stygica* Say, correct.
133. *Trichia punctulata* Reut. This specimen is in poor condition but is undoubtedly a *Tropidosteptes*, perhaps *pettiti* or *palmeri*. With it stands a pale example of *Lygus pratensis* Linn.
134. *Stenarops chloris* Uhler is *Tropidosteptes commissuralis* Reut.
134. *Stenarops malinus* Uhler is a large pale *Lygus pratensis* Linn.
135. *Labops hesperius* Uhler, correct.
136. *Orthocephalus saltator* Hahn. A Capsid new to me but certainly not the European *saltator* Hahn.
137. *Chlamydatus luctuosus* n. sp. On this label is a broken specimen of *Dicyphus agilis*, but it does not agree with the description entirely and may be an error.
138. *Orthotylus dorsalis* Prov. is *O. congrex* Uhler. This specimen agrees in all respects with Provancher's description of 1872 and the name must take precedence over Uhler's published in 1887.
140. *Dicyphus californicus* Stal, correct.
141. *Idolocoris famelicus* Uhler is *Macrolophus separatus* Uhler.
141. *Idolocoris agilis* Uhler is correct.
143. *Hyaliodes vitripennis* Say, correct.
144. *Malacocoris provancheri* Burque is a good species of *Diaphnidia* near *pellucida* Uhler.
146. *Parthenicus psalliodes* Reut. On this label is a very poor specimen of *Ilnacora stalii* Reut.
147. *Globiceps flavomaculatus* Fabr. is *Mimoceps gracilis* Uhler.
148. *Oncotylus decolor* Fall., correct. *Lopus decolor* Fall.'
148. *Oncotylus pulchellus* Reut. is *Orthotylus flavosparsus* Fall.
149. *Oncotylus punctipes* Reut. Probably correctly determined. Our American species differs from Reuter's description only in wanting the black pubescence on the antennæ and venter and in having the areoles scarcely darker than the rest of the membrane.
150. *Macrocoleus coagulatus* Uhler, probably correct.
150. *Amblytylus 6-guttatus*, n. sp. A distinct and beautiful species belonging to genus *Macrotylus* I took it at Ottawa.
152. *Psallus delicatus* Uhler is a form of *Plagiognathus obscurus* Uhler.

153. *Plagiognathus fuscus* Prov. Under this name is placed the ordinary form of *P. obscurus* Uhler, but it is not the *fuscus* nor the *dorsalis* of the NAT. CAN., 1872, as quoted by Provancher. The former is very close to if not identical with *P. politus* Uhler.

154. *Plagiognathus rubricans*, n. sp. A good species pertaining to genus *Rhinocapsus* Uhler. It differs from *vanduzeei* Uhler in being larger and in having the second antennal joint entirely black. Mrs. Slosson has recently taken this species at Lake Toxaway, N. C.

155. *Agalliasstes associatus* Uhler, correct. NOTE.—Among the Capsids in this collection is a *Garganus fusiformis* Say named *Megocælum signatum* Dist., and a *Ceratocapsus pumilus* determined as *Ceratocapsus lutescens* Reut

155. *Agalliasstes verbasci* H. S., correct. *Chlamydatius* is now used for this genus.

158. *Corythuca ciliata* Say is a variety of *arcuata* Say.

158. *Corythuca juglandis* Fitch is a typical *arcuata* Say.

159. *Leptostyla oblonga* Say. This seems to be a *Leptobyrsa*, probably *explanata*, but unfortunately I had no specimen for comparison.

159. *Gargaphia tilia* Walsh, correct.

160. *Pysatochila plexa* Say, correct.

160. *Leptophya mutica* Say, correct.

162. *Phymata wolfii* Stal is *erosa pennsylvanica* Handl.

165. *Aradus robustus* Uhler is *4-lineatus* Say.

165. *Aradus aequalis* Say is *robustus* Uhler.

166. *Aradus acutus* Say. On this label was a species still undetermined in my collection but quite distinct from *acutus* Say.

166. *Aradus 4-lineatus* Say. The species under this name was new to me and was quite distinct from either *4-lineatus* or *robustus*.

167. *Aradus similis* Say. This seemed to be *tuberculifer* Kirby as nearly as I can tell without comparing specimens directly.

167. *Aradus rectus* Say, correct. *A. lugubris* Fallen.

167. *Brachyrhynchus granulatus* Say. New to me but not *granulatus* as determined in my collection.

168. *Brachyrhynchus lobates* Say is the *granulatus* of my collection.

169. *Aneurus politus* Say is *septentrionalis* Walker.

169. *Aneurus inconstans* Uhler, correct.

170. *Cimex lectularius* Linn., correct.

175. *Coriscus subcoleoptratus* Kirby, correct.

175. *Coriscus propinquus* Reut. is the young of the preceding species.

175. *Coriscus vicarius* Reut. is the larval form of *Alydus eurinus* Say.

176. *Coriscus inscriptus* Kirby is *C. rufusculus* Reut. The name *Reduviolus* is now used for this genus. NOTE.—In the collection is an *Acholla mutispinosa* De G. labelled *Sinea coronata* Stal, and a *Diplocodus exsanguis* Stal. labelled *Acholla tabida* Stal.

176. *Coriscus ferus* Linn., correct.

180. *Sinea diadema* Fabr., correct.

181. *Diplodus luridus* Stal. is *Diplocodus luridus* Stal., female.

181. *Darbanus georgiæ* Prov. is a worn female specimen of *Diplocodus luridus* Stal.

182. *Darbanus palliatus*, n. sp. is the male of *Diplocodus luridus* Stal.

182. *Evagoras marginata*, n. sp., is *Zelus cervicalis* Stal.

183. *Melanolestes picipes*, H. S., correct.

183. *Melanolestes abdominalis*, H. S., correct. Leconte is authority for this species.

184. *Opsicæus personatus* Linn., correct. An immature specimen is his *Reduvius albosignatus* as suggested by him. The name *Reduvius* is now used for *Opsicæus*.

186. *Emesa longipes* De Geer. Under this name is a *Ploiariola*, probably *errabunda* Say.

186. *Cerascopus errabundus* Say. The insect on this label seems to be a *Barce* but I could not locate the species without material for comparison.

189. *Salda ligata* Say, probably correct.

190. *Salda obscura* Prov. is *littoralis* Linn.

190. *Salda major* Prov. is *deplanata* Uhler which name it must supercede as it has priority by one year.

191. *Salda littoralis* Linn. is *interstitialis* Say.

191. *Saida lugubris* Say. Apparently *repleta* Uhler but I could not be certain without specimens for comparison.

192. *Sciadopterus bouchervillei* Prov. is *coriacea* Uhler which name it must supercede having priority.

193. *Limnobates lineata* Say, correct.

195. *Gerris rufoscutellatus* Latr., correct.

195. *Gerris remigis* Say, correct.

195. *Gerris marginatus* Say, correct.

196. *Gerris canaliculatus* Say. This may be *buenoi* Kirk. It is smaller than *marginatus* and stouter than *canaliculatus* usually is but I

could not be certain of the determination without specimens for direct comparison.

197. *Belostoma grisea* Say, correct. *Benacus grisea* Say.

198. *Zaitlia fluminea* Say, correct. *Belostoma fluminea* Say.

199. *Ranatra fusca*, P. B. is *R. americana* Montd.

200. *Notonecta irrorata* Uhler, correct.

201. *Notonecta undulata* Say, correct.

202. *Corisa*, spp. My own material in this genus is still unworked and I did not attempt to locate the Provancher species.

204. *Prionosoma villosum*, n. sp. does not differ in any respect from *podopoides* Uhler.

204. *Euschistus jugalis*, n. sp. I could not find this in the collection but from the description I am now strongly inclined to consider it the form of *servus* with acute *humerali* although it might be *conspersus* Uhler.

205. *Platygaster pacificus*, n. sp., correct.

211. *Cicada pruinosa* Say, correct.

212. *Cicada septendecim* Linn., correct. *Tibicina septendecim* Linn.

213. *Cicada canadensis*, n. sp. This is *rimosa* Say more strongly marked with orange on the base of the elytra and wings than usual. I have an exactly similar specimen which I cannot distinguish from *rimosa*. It belongs to genus *Okanagama* Dist. and not to *Tibicen*, and is not *noveboracensis* Emmons as I had conjectured.

214. *Cicada rimosa* Say. The ordinary dark form of this species.

217. *Amphiscepa coqueberti* Kirby is *Otiocerus degeeri* Kirby.

218. *Hysteropterum semivitreum*, n. sp. This species was a surprise to me and I had taken nothing at all allied to it for comparison. It seems to belong to the Californian group of *Issids* and is very close to *Dictyobia permutata* Uhler. It may be an accidental introduction from the west.

219. *Scolops sulcipes* Say, correct.

220. *Helicoptera septentrionalis*, n. sp. This is the *Elidiptera* I have been determining as *septentrionalis* Prov.

221. *Helicoptera vestita*, n. sp., is *Elidiptera opaca* Say.

222. *Cixius stigmatus* Say. This is the *C. stigmatus* of my table published in CAN. ENT., XXXVIII, p. 408, Dec., 1906.

223. *Oliarus quinquelineatus* Say, correct.

223. *Oliarus cinnamomeus*, n. sp., correct.

224. *Delphax unipunctata* Prov. is *Stenocranus dorsalis* Fitch.

225. *Delphax furcata* Prov. This seems to be a good species of *Liburnia*.

229. *Enchenopa binotata* Say, correct.
229. *Enchenopa latipes* Say, correct. *Campylenchia latipes* Say.
230. *Archasia canadensis*, n. sp., is *A. belfragei* Stal.
231. *Janthe expansa* Germ, correct. *Antianthe expansa* Germ.
232. *Entylia sinuata* Germ. is male of *E. bactriana* Germ.
232. *Entylia carinata* Germ. is female of *E. bactriana* Germ,
233. *Entylia concava* Germ. is *E. concisa* Walk.
234. *Ceresa diceros* Say, correct.
235. *Ceresa bubalus* Fabr. On the label is *C. taurina*, Fh. and by it a male of *C. bubalus* Fabr.
235. *Ceresa brevicornis* Fitch. On this label is a female *C. basalis* Walk., and next it is a female *bubalus* Fabr.
235. *Ceresa semicrema* Say. Under this name is a dark male and female of *Ceresa basalis* Walk.
237. *Stictocephala inermis* Fabr., correct.
237. *Stictocephala festina* Say is *lutea* Walk.
238. *Cyrtosia vau* Say is probably correct. This specimen has no cloud at apex of the elytra and is larger and darker than usual.
239. *Cyrtosia trilineata* Say, correct.
239. *Cyrtosia fenestrata* Fitch. Under this name is a dark male of *vau* Say.
240. *Cyrtosia ornata*, n. sp., is the male of *C. cinereus* Emmons.
241. *Thelia univittata* Harr. is *godingi* Van D.
242. *Thelia bimaculata* Fabr., correct.
243. *Telamona scalaris* Fairm., correct. *Heliria scalaris* Fairm.
243. *Telamona tristis* Fitch, correct.
244. *Telamona unicolor* Fitch, correct.
144. *Telamona fasciata* Fitch, correct. Male of *unicolor* Fh.
244. *Telamona reclinata* Fitch, correct.
245. *Publilia concava* Say, correct.
246. *Carynota mera* Say, correct.
246. *Carynota picta*, n. sp., is *C. porphyrea* Fairm.
247. *Ophiderma marmorata* Say is *Carynota stupida* Walk. (*mus-kokensis* Godg.).
248. *Ophiderma inornata* Say is *flava* Godg., a little clouded with reddish.
248. *Tragopa brunnea* Prov. is *Acutalis semicrema* Say.
250. *Platycotis 4-vittata* Say, correct.

251. *Platycotis nigromaculata*, n. sp., is *P. sagittata* Germ.

[Under the name *Telamona querci* Fh. is a species I cannot distinguish from *obsoleta* Ball (from memory only) but it is certainly not *querci*.]

253. *Bruchomorpha oculata* Newm., correct.

254. *Embolonia tricarinata*, n. gen. et. sp., is the *macropterous* form of *Bruchomorpha oculata* Newm.

255. *Aphrophora parallela* Say, correct.

256. *Aphrophora 4-notata* Say, correct.

256. *Aphrophora quadrangularis* Say, correct. *Lepyronia id.*

257. *Philænus spumarius* Linn., correct.

258. *Philænus lineatus* Linn., correct.

258. *Philænus albiceps* Prov., is *spumarius* var. *leucocephala* Linn.

259. *Clastoptera obtusa* Say, correct.

260. *Clastoptera proteus* Fitch is *obtusa* var. *tristis* Van D.

260. *Clastoptera saint-cyri* Prov. is the variety of *proteus* later named subspecies *flava* by Ball.

263. *Tettigonia viridis* Fabr. This is the European *viridis* Linn. As there seems to be no reason to question Provancher's statement that this specimen was taken in Quebec we must add the species to our list of North American *Hemiptera*.

263. *Tettigonia tripunctata* Sign is *Kolla tripunctata* Fitch.

265. *Proconia undata* Fabr., correct.

265. *Proconia costalis* Fabr., correct.

266. *Diedrocephala mollipes* Say is *Draculacephala noveboracensis* Fitch,

267. *Diedrocephala coccinea* Forst., correct.

267. *Diedrocephala hieroglyphica* Say is *Tettigoniella gothica* Sign.

268. *Helochara communis* Fitch, correct.

268. *Acopsis viridis* Linn. is *Draculacephala mollipes* Say.

269. *Gypona quebecensis* Prov. Under this name is straight *cana* Burm. It is not the species formerly sent to me by Provancher as *quebecensis* which was smaller and of a deeper green color.

269. *Gypona hullensis*, n. sp., is *pectoralis* Spangb.

270. *Eucanthus orbitalis* Fitch. Dr. Ball now places this as a synonym of *E. acuminatus* Fabr.

270. *Penthimia picta* Prov. The specimen is missing from this label but there can be no question that it is the male of *americana* Fitch.

275. *Platymetopius acutus* Say, correct.

275. *Platymetopius magdalensis*, n. sp. This is the species later described by Prof. Osborn as *obscurus*.

276. *Scaphoideus immistus* Say, correct.

277. *Scaphoideus auronitens*, n. sp., correct.

278. *Deltocephalus curtisii* Fh., correct. *Athysanus curtisii* Fh.

278. *Deltocephalus inimicus* Say, correct.

279. *Deltocephalus citronellus* Prov. The insect on this label is a *Thamnotettix* probably still undescribed. It is not the form described in the NAT. CAN., p. 378.

279. *Deltocephalus minkii* Fieb., correct.

280. *Deltocephalus sayi* Fitch, correct.

280. *Selenocephalus placidus*, n. sp. This is an *Acucephalus* new to me. It has a dark shade under the sharp lunately rounded anterior margin of the vertex and the apex of the elytra are coarsely alternated with fuscous points which are not properly indicated in Provancher's description. It may be one of the European species already recognized from this country.

281. *Athysanus obsoletus* Kirsch. is now known as *relativus* Gill. & Baker.

282. *Athysanus plutonius* Uhler. This has more recently been separated out as a distinct species under the name *uhleri* Ball.

282. *Acocephalus circumflexus*, n. sp., is the male of *albifrons* Linn.

283. *Thamnotettix citronellus* Prov. Under this name is a very pale specimen of *eburata* Van D., but it does not answer to the description in the NAT. CAN., p. 378, and cannot be that insect.

284. *Thamnotettix clitellarius* Say, correct.

284. *Thamnotettix subcupræus* Prov., correct.

284. *Thamnotettix melanogaster* Prov., correct.

285. *Thamnotettix decipiens*, n. sp. The only specimen on this label is much paler than this species is generally found in the east.

285. *Thamnotettix seminudus* Say, correct. *Eutettix seminuda* Say.

286. *Jassus unicolor* Fh., correct. *Chlorotettix unicolor* Fh.

286. *Allygus irroratus* Say, correct. *Phlepsius irroratus* Say.

287. *Cicadula 6-notata* Fall., correct.

288. *Bythoscopus clitellarius* Fitch is *Idiocerus provancheri* Van D.

289. *Bythoscopus fenestratus* Fh. is a pale form of *Oncopsis nigrinasi* Fh.

289. *Bythoscopus variegatus* Fh., correct. *Oncopsis variegatus* Fh.

290. *Bythoscopus pruni* n. sp., correct. *Oncopsis pruni* Prov.

291. *Idiocerus pallidus* Fitch, correct.

292. *Idiocerus verticis* Say. I was not able to locate this nearer than to place it in the *alternatus* group. It is not the western *verticis*.
292. *Idiocerus duzeii*, n. sp., correct.
292. *Idiocerus subbifasciatus* Say is *lachrymalis* Fitch.
293. *Idiocerus alternatus* Fitch, correct.
293. *Idiocerus novellus* Say, correct. *Agallia novella* Say.
294. *Pediopsis viridis* Fitch, correct.
295. *Pediopsis basalis* Van D., correct.
295. *Pediopsis insignis* Van D., correct. Now known as *trimaculata* Fitch. This genus must be known as *Macropsis*.
295. *Pediopsis flavescens* Prov. A small female of *Oncopsis nigrinasi* Fh.
296. *Agallia sanguinolenta* Prov., correct.
296. *Agallia 4-punctata* Prov., correct.
298. *Erythroneura mali*, n. sp., is *Dicraneura communis* and must be known as *Dicraneura mali* Prov.
298. *Erythroneura vitis* Harris, correct.
299. *Erythroneura vitifex* Fitch, correct.
299. *Erythroneura vulnerata* Fitch, correct.
299. *Erythroneura rosæ* Linn., correct. These are now placed in *Typhlocyba*.
300. *Typhlocyba jocosa* Prov. A reddish form of *Balclutha punctata* Thunb.
301. *Typhlocyba punctata* Thunb. is the common green form of that species.
335. *Cymus angustatus* Stal., correct.
336. *Aradus abbas* Bergr., correct.
336. *Coriscus flavo-marginatus* Scholz., correct.
337. *Delphax bifasciatus*, n. sp., is *Stobaera tricarinata* Say, a little faded.
338. *Ceresa subulata* Say is *constans* Walk.
338. *Helochara bifida* Say, correct. *Kolla bifida* Say.
339. *Deltocephalus chlamydatus*, n. sp. is an *Athysanus* later described as *infuscata* by Gillette and Baker.
339. *Deltocephalus superbus*, n. sp., is a *Xestocephalus* later described by me as *fulvocapitatus*.
340. *Erythroneura obliqua* Say, correct. *Typhlocyba obliqua* Say.
340. *Typhlocyba unica*, n. sp., is an *Empoasca* later described as *splendida* by Gillette.

ON SOME UNDESCRIBED FORMS OF FLORIDA COLEOPTERA.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

In 1911 I spent the time from January 8th to April 17th in Central and Southern Florida, and while there collected insects in a number of localities, notably near Sanford, St. Petersburg, Sarasota, Ft. Myers, Little River, and Ormond. The time of year was not the best for the most successful collecting, as the insects of Florida hibernate in much the same manner as they do farther north, many of them being represented there, as here, during the winter months in the egg, larval and pupal stages. However, about 500 species of Coleoptera were taken, and also many Orthoptera, Hemiptera and butterflies. It is at present my intention to again visit Florida in January, 1913, and, perhaps, stay later in the spring, making collections in the same orders, and then publish notes on the "catch" of the two seasons. Meanwhile, a few forms of Coleoptera, which have apparently hitherto escaped observation, are herewith described.

Calambus marginipennis, sp. nov.

Short, rounded, oval, subdepressed above, moderately convex beneath. Head, thorax, under surface, femora and tibiæ reddish brown; elytra piceous-black, shining, with narrow side margins, broadening into a rounded lobe at middle, reddish brown, tarsi and apical fourth of antennæ dusky. Clypeus broadly rounded, distinctly margined. Head and thorax finely, evenly but not densely punctate; the elytra more coarsely, densely and rather shallowly punctate. Meso- and meta-sterna coarsely, rather sparsely and deeply punctate, the punctures of abdomen finer and more shallow. Length 2.5—2.8 mm.

Frequent in shallow brackish ponds, one to two miles inland, near Sarasota, Florida. March 1—3. This beetle has the form of *C. acaroides* Lec., but the elytra are differently coloured, and without the carinæ of that species. It is a little larger, more rounded, and much more coarsely punctate than *C. farctus* Lec. In a few specimens the elytra are mostly wholly piceous, but in the great majority the paler side margins broaden at middle to form a rounded lobe.

Aphodius campestris, sp. nov.

Elongate-oblong, convex. Head and thorax reddish or pale chestnut brown, shining, the latter with front margin darker; elytra, under surface

November, 1912

and legs brownish yellow. Head very finely and sparsely punctate, not tuberculate; clypeus broadly and shallowly emarginate at middle, the sides curved. Thorax not narrowed in front, sides broadly curved, hind angles obtusely rounded; base very distinctly margined, disk finely and sparsely punctate. Elytra equal in width to thorax, finely striate, the striae finely and indistinctly punctate; intervals feebly convex, smooth. Front tibiae stout, broad, distinctly punctate in front, strongly 3-toothed. Hind tibiae rather slender; first joint of hind tarsi as long as the next three together. Length 3 mm.

Two specimens from beneath dry cow-dung in company with *A. vestiarius* Horn, near Sarasota, February 17th. Closely related to *A. rubeolus* Beauv., but smaller, more slender, with paler elytra, longer basal joint of hind tarsus, and with base of thorax distinctly margined. One of the types is in the collection of F. Blanchard, Tyngsboro, Massachusetts.

Hymenorus granulatus, sp. nov.

Oblong-parallel, subdepressed, sparsely pubescent with fine recumbent grayish hairs. Black, shining; palpi and mandibles reddish brown, tarsi piceous. Eyes large, separated by about one-half their own diameters; antennae stout, half the length of the body, the joints flattened, triangular, the third twice as long as second, half the length of fourth. Thorax at base one-third wider than long, sides broadly rounded into the front margin, base slightly sinuate each side near middle; disk strongly declivent in the region near the front angles, obsolete foveate each side of middle at base, very densely and coarsely punctate, the punctures feebly separated or in part confluent. Elytra slightly wider than base of thorax, their sides parallel to apical fourth; disk striate, the intervals convex, densely granulate-punctate. Basal joint of hind tarsi slightly curved, one-half longer than the remaining joints together. Length 7—7.5 mm.

Described from four specimens beaten from scrub-oak foliage near Sanford, March 28—29. The dense punctuation of thorax and elytra, taken in connection with the uniform shining black color, readily distinguishes this from all other described species of *Hymenorus*.

Andrimus confusus, sp. nov.

Elongate-oval, sparsely clothed with short, suberect yellowish hairs. Head, thorax, under surface and legs reddish brown; elytra and antennae dark chestnut brown. Head transversely sulcate in front of eyes, finely and rather closely punctate, alutaceous between the punctures; eyes large,

separated by nearly their own width; antennæ slender, one-half the length of body, the joints obconical, the third more than twice the length of second, one-half the length of fourth. Thorax three-fourths as long as wide, sides parallel from base two-thirds their length, then broadly rounded into the front margin; disk evenly convex, very finely alutaceous, finely and sparsely punctate, without trace of median line or basal foveæ. Elytra one-fourth wider than thorax, their sides parallel to apical fourth then rounded to a blunt apex; disk striate, the striæ with rows of close-set punctures; intervals feebly convex, each with two rows of minute punctures. Abdomen smooth. Basal joint of hind tarsi equal in length to the other three combined. Length 9 mm. Two species beaten from live oak near Sanford. March 29.

Diaperis maculata floridana, var. nov.

This variety differs from typical *maculata* (*hydni* Fab.) in the colour of the elytra, the elongate submarginal dark spot near the humeral angle of *maculata* being absent and the large irregular black spot on apical third here uniting with the sutural black stripe to form a common cross-bar.

Frequent beneath bark of fungus-covered oak log near Sarasota. Feb. 28. Horn in his remarks on *D. maculata** states, "This species is remarkably uniform in its system of elytral coloration."

Mr. F. W. L. Sladen, F. E. S., has been appointed Assistant Entomologist for Apiculture in the Division of Entomology, Ottawa. Up to the time of his appointment, Mr. Sladen devoted his whole time to Apiculture in England, where he possessed a large apiary and made a special study of queen-rearing according to scientific methods. His writings on the subject include "Queen-rearing in England", "Breeding the British Golden Bee", and several articles on the collection of pollen, etc. His studies of the *Bombi* are recorded in "The Humble Bee", reviewed in the present number of this Journal. As he has travelled in Europe, India and North America his knowledge of Apiculture and native bees is unusually wide and his appointment will prove an additional source of strength to the Division of Entomology, where he will have charge of the apicultural work. He will also study the Canadian *Bombi* and native bees.

C. G. H.

*Trans. Amer. Philosophical Soc., XIV, 379.

- Legs with the femora dark brown at the tip with an indistinct sub-apical ring ; a cross-vein in cell R_3 ; seam on cord pale brown, broad ; antennæ pale.....*translucida*, sp. n.
(Panama)
5. Wings with an abundant pattern in the cells.....*gloriosa*, sp. n.
(Guatemala)
- Wings with the markings scanty and more or less confined to the neighbourhood of veins.....6.
6. Wing hyaline, with the markings brown ; pleuræ with a brown band ; tibiæ and tarsi uniform dark.....*eiseni*, sp. n.
(Guatemala)
- Wing dusky, with the markings dark brown ; no pleural band ; tibiæ at tip, and tarsi, orange brown.....*lutzi*, sp. n.
(Brit. Guiana)

Furcomyia reticulata, sp. n.

Antennæ brown ; thorax yellow, with an irregular brown median stripe ; legs yellow, darkening to brown apically ; wings hyaline, reticulated with brown marks.

♀.—Length, 4.5–6 mm ; wing, 5.3–5.4 mm.

♀.—Head : rostrum yellowish brown ; palpi dark brownish black. Antennæ, basal segments pale, whitish ; flagellum light brown, the segments rounded, becoming oval and then elongated toward the tip of the antennæ. Front, vertex and occiput dull yellow, the vertex and occiput prolonged caudad, with two brown stripes above and brown on the sides.

Thorax : pronotum brown, thickly yellow pollinose ; a small brown median spot at the caudal margin of the scutum. Mesonotum, præscutum dull yellow sericeous, a broad, light brown median stripe, overlain by a dark brown stripe, whose margins are very irregular ; two interrupted brown stripes on either side of the median mark, the outermost very pale on the margin of the sclerite ; scutum dull brown, with four brown stripes, continuations of the lateral præscutal vittæ ; the two stripes on each side unite at the caudal margin of the sclerite and run half across the scutellum ; scutellum very pale, whitish yellow, sending a median prolongation cephalad onto the scutum ; postnotum brown. Pleuræ light brown, thickly pale yellowish pollinose. Halteres very pale yellow, the knob brown. Legs : coxæ, trochanters and femora dull yellow, the femora darkening to brown apically ; extreme base of the tibiæ whitish, rest of tibiæ and the tarsi dark brown. Wings, veins brown, except costa, which is light yellow and black alternated ; membrane hyaline, costal cell with

small, equally-spaced brown marks ; from the base to the tip of R_1 about 19, these marks a trifle narrower than the hyaline interspaces ; five large brown blotches along the radial cells, the first at the base of vein M ; second in middle of cell R ; third just before the origin of R_s ; fourth over the fork of R_s , and the last at the tip of R_{2+3} , irregular ; all the cells with narrow brown marks across them producing a net-work. Venation (see fig. p) : Sc short, Sc_1 ending before the origin of R_s , Sc_2 about opposite it ; Sc_2 longer than Sc_1 ; R_s angular at base ; basal deflection of M_{1+2} long, so that the inner end of cell 1st M_2 is almost on a level with cell R_3 ; basal deflection of Cu_1 before fork of M , sometimes far before ; cross-vein m far out, so that the deflection of M_3 is much longer than m .

Abdomen, tergum, segments brown, darkest on caudal margin, paler on the sides ; sternum dull yellow ; a dark brown median spot on caudal margin of each sclerite.

Holotype, ♀.—Pinar del Rio, Cuba ; 1900 (Palmer and Riley).

Paratype, ♀.—Type locality, March 27, 1900 (Palmer and Riley).

Types in U. S. Nat. Mus. coll. (No. 15,133).

Furcomyia osterhouti, sp. n.

Whitish ; mesothoracic præscutum with a broad median stripe and two short lateral ones ; femora black, with a postmedian reddish annulus ; wings with brown spots, bands and seams.

♀.—Length, 6.5 mm (about) ; wing, 5.7 mm.

♀.—Head : rostrum and palpi dark brownish black. Antennæ, basal segments yellowish brown, flagellum very dark brown, almost black. Front, vertex and occiput pale, whitish, tinged with brown.

Thorax : pronotum dark brown above, abruptly pale, yellowish white on the sides. Mesonotum pale yellowish white, the median stripe broad, dark brown ; the lateral stripes appear on the hind margin of the præscutum and run back across the scutum and scutellum ; at the caudal end of the latter sclerite they unite and form a very broad median band, which occupies the dorsum of the postnotum. Pleuræ pale, whitish. Halteres, knob and most of the stem dark brown. Legs : coxæ and trochanters yellowish brown ; femora black, with a distinct reddish annulus at about three-fourths the length ; tibiæ reddish at base, rest of tibiæ and tarsi shiny black. Wing with a slight yellowish tinge, especially in the cephalic cells ; a very narrow brown mark from h caudad ; a brown mark from the tip of Sc_1 down beyond R_s ; a brown mark at tip of R_1 and on r ; a narrow seam along the cord ; outer end of cell 1st M_2 seamed with brown ; most

of the veins seamed with brown ; apical portions of the radial cells suffused with brown. Venation : (See fig. q.) Sc ends beyond origin of Rs, Sc₂ at its tip ; cross-vein *r* at tip of R₁ ; Rs arcuated at origin ; basal deflection of Cu₁ before the fork of M.

Abdomen, tergum yellowish, the apex of each sclerite brown, with a narrow brown median band ; sternum, markings less clearly defined.

Holotype, ♀.—Bocas d'Toro, Panama ; Sept. 28, 1903. (P. Osterhout, coll.)

Type in U. S. Nat. Mus. coll. (No. 15,130.)

Furcomyia translucida, sp. n.

Whitish ; mesothoracic præscutum with a narrow median brown stripe ; femora darkened at the tip, pale subapically ; wings with brown spots and bands ; a supernumerary cross-vein in cell R₃.

♂.—Length, 5.8 mm. ; wing, 6.9 mm. ; middle leg, femur, 5.7 mm. ; tibia, 5.2 mm.

♂.—Head : rostrum and palpi dark brown. Antennæ, basal segments brown, flagellum yellowish, the terminal three or four segments brown ; segments of the flagellum short, globular, the apical segments more elongated. Front, vertex and occiput light yellow, the vertex with a large brown spot in the centre.

Thorax : pronotum dark brown, becoming paler, yellowish white on the sides ; mesonotum, præscutum very pale, almost white, with a clearly-defined dark brown median stripe, rather narrow, ending at the suture ; scutum and scutellum pale, whitish, with a dark brown stripe on each lobe, running backward and meeting on the caudal margin of the scutellum ; postnotum with a very broad brown median mark resulting from the confluence of the scutellar stripes. Pleuræ very pale, whitish ; a brownish mark on the propleuræ above the fore coxa. Halteres pale, knob dark brown. Legs : coxæ and trochanters whitish ; femora yellowish brown ; a clearer yellow subapical ring, tip broadly brown, the extreme apex again rather lightened ; tibiæ and tarsi brown, gradually increasing to dark brown. Wings : subhyaline or very faintly yellowish ; a brown mark at the humeral cross-vein extending down across the arculus ; a second mark at tip of Sc₁ and down across Rs almost to M ; a third, extending into a cross-band, from the stigma, where it is darkest, unbroken across the cord ; a brown seam on the supernumerary cross-vein in cell R₃ ; outer end of cell 1st M₂ seamed with brown. Venation : (See fig. r.) Sc short, ending just beyond the origin of Rs ; Sc₂ just opposite origin of Rs ; R₁ extending beyond cross-vein *r-m*, *r* at its tip. Rs square at its origin and

spurred, in a line with R_{2+3} ; a strong cross-vein in cell R_3 at about two-thirds of the length of the cell; cell 1st M_2 rather elongate; basal deflection of Cu_1 at the fork of M .

Abdomen: tergum pale yellowish white, apical fourth dark brown; apex sternum similar, but the dark apex not so clearly defined.

Holotype.—♂. Bocas d'Toro, Panama; Sept. 28, 1903. (P. Osterhout, coll.)

Type in U. S. Nat. Mus. coll. (No. 15,129)

Furcomya gloriosa sp. n.

Antennæ brown; thorax gray, dorsum striped with darker; legs, femora dark on apical half, with a subterminal yellow ring; wing spotted and suffused with brown.

♀.—Length about 6.5 mm.; wing, 8.4 mm.

♀.—Head: rostrum and palpi dark brown. Antennæ, basal segments very dark brown; basal five flagellar segments lighter brown, apical segments dark brown. Front, vertex and occiput dull gray, with a black mark on vertex along inner margin of the eye.

Thorax: pronotum dull greenish gray pollinose, with a broad black stripe on the side of the scutum. Mesonotum, præscutum dark brown, thickly grayish pollinose, with a black stripe on either side of the narrow median gray line, running from the anterior margin of the sclerite almost to the suture. Lateral stripes short, broad, beginning behind the pseudo-sutural fovea, running across the suture and covering most of the scutum; scutum in middle and along the caudal margin dark brown; scutellum and postnotum dark brown. Pleuræ black, greenish gray pollinose. Halteres, stem pale yellowish brown, knob dark brown. Legs, coxæ and trochanters dark brown, the former gray pollinose; femora light yellow, the apical quarter dark brown, with a subapical yellow ring. Wings hyaline or nearly so; costal cell with four brown marks, the last at Sc , the 3rd over the origin of Rs ; a large square mark at the tip of R_1 (stigmal) extending down over the fork of Rs ; cells 2nd R_1 and R_3 with large brown spots filling most of the cells; cells R_5 to Cu_1 suffused with lighter grayish brown and with hyaline spots; basal and anal cells with smaller brown spots; a series of about four in cell 1st A . Ends of veins Cu_2 , 1st and 2nd A , with broad, grayish brown suffusions. Veins brown; Sc and R yellow, except where located in the brown markings, where they are black. Venation: (See fig. j.) Sc long, ending far beyond the origin of Rs , but slightly before its middle; Rs long; basal deflection of Cu_1 far before the fork of M .

Abdomen, tergum dark brown; sternum lighter brown, extreme caudal margins of the sclerites light yellow.

Holotype.—♀. Totonicipan, Guatemala, Cent. Am., 1902. (Dr. G. Eisen.)

Type in U. S. Nat. Mus. coll. (No. 15,132.)

This insect agrees superficially with *muscosa* End.* of Ecuador, but has *Sc* much longer, legs very different in colour, and is a much smaller species. *Muscosa* has a supernumerary cross-vein in cell R_3 , but this may not be normal, as it is not mentioned in the specific description.

Furcomyia eiseni, sp. n.

Antennæ black throughout; body yellow; legs, femora yellow, passing into brown on the tibiæ and tarsi; wings hyaline, with six brown spots along costa, the second, largest, at origin of R_s .

♂.—Length, from 4.5–5 mm.; wing, 6.3–7.5 mm.

♀.—Length, from 4.5–6 mm.; wing, 5.7–7 mm.

Head: rostrum and palpi black. Antennæ black throughout in the ♂, with conspicuous long hairs, not so noticeable in the ♀. Front, vertex and occiput blackish, grayish pollinose in front.

Thorax: pronotum dull yellow; mesonotum dull reddish yellow, with a very indistinct darker median stripe and darker lateral stripes which are brownish, these continued back on the scutum, where they cover the lobes; scutellum and postnotum brownish. Pleuræ yellow, with a more or less conspicuous dark brown stripe running from the cervical sclerites to the postnotum. Halteres yellow at base; apical half of the stem and the knob brown. Legs: coxæ and trochanters light yellow; femora yellow at base, passing into brown; tibiæ and tarsi darker brown. Wings hyaline; cells *C* and *Sc* slightly yellowish; six brown marks along the costal margin on the cross-veins, as follows: A brown mark at the wing base; a large brown rectangular mark at the origin of R_s ; a third at the tip of *Sc*, where it is continued down over the fork of R_s , here meeting the fourth blotch, located at the tip of R_1 ; the marks continuing across the cord; wing subapically largely dark; outer end of cell 1st M_2 seamed with brown; a brown mark in the end of cell 2nd R_1 and cell R_3 ; ends of veins Cu_1 , Cu_2 and 1st *A*, with small brown clouds; a large spot at end of 2nd *A*. Venation: (See fig. s.) *Sc* long, ending just before the fork of R_s , Sc_2 at its tip; R_s square at its origin; base of cell 1st M_2 arcuated, nearly on a level with the inner end of cell R_3 (as in *stulta* O. S.);

*1912. Zool. Jahrbuch.; pt. 1, pp. 75, 76; fig. W¹. (*Dicranomyia*.)

basal deflection of Cu_1 just beyond the fork of M; Cu_2 generally shorter than the deflection of Cu_1 .

Abdomen, tergum dark brown, the bases of the sclerites somewhat paler; sternum light yellow, the caudal and lateral margins conspicuously dark brown.

Holotype.—♂. Aguna, Guatemala, Cent. Am. (2,000 ft.); Sept., 1902. (Dr. G. Eisen, coll.)

Allotype.—♀. With the type.

Paratypes.—5, ♂ ♀. With the type.

Types in U. S. Nat. Mus. coll. (No. 15,131), except one paratype in author's collection.

Lurcnyi lutzii, sp. n.

Antennæ black; body orange; abdomen brown; legs black, tip of tibiæ and the tarsi pale, orange yellow; wings dusky, with brown marks.

♀.—Length about 6 mm.; wing, 7.3 mm.; middle leg, femur, 5.4 mm.; tibia, 5.8 mm.

Head: rostrum and palpi dark brownish black. Antennæ dark brownish black. Front thickly gray pollinose; vertex and occiput dark orange brown, brighter orange on the occiput.

Thorax: pronotum and mesonotal præscutum and scutum deep orange; scutellum and postnotum much lighter coloured, yellowish orange. Pleuræ orange yellow, lighter coloured ventrally. Halteres, stem yellowish basally, darkening to the blackish knob. Legs: coxæ and trochanters orange yellow, extreme base of femora yellow; remainder of femora and most of the tibiæ dark brownish black; tibiæ with the apical eight pale orange brown; tarsi orange brown. Wings suffused with dark brown, costal and subcostal cells and the radial cells very dark; dark brown spots arranged as follows: a rounded mark at the origin of Rs; one at fork of Rs, continued down the cord as a broken seam; a round spot at end of R_1 ; outer end of cell 1st M_2 seamed with dark brown. Venation: Sc long, ending nearer to the fork of Rs than to the origin, Sc_2 at tip of Sc_1 . Cross-vein r at the tip of Rs; deflection of R_{4+5} long; basal deflection of Cu_1 far before the fork of M.

Abdomen, tergum, segments dark brown; sternum light yellow.

Holotype.—♀. Tukeit, British Guiana; July 19, 1911. (F. E. Lutz, coll.)

Type in American Museum of Natural History.

Furcomyia omissa, sp. n.

Small; dark brown; wings dark, stigma present; Sc_1 short, Sc_2 apparently lacking.

♀.—Length, 3.7–4 mm.; wing, 4–4.2 mm.

♀.—Head: rostrum and palpi dark brownish black. Antennæ brownish black. Front, vertex and occiput brown.

Thorax: mesonotum, præscutum with a thick brownish pollen, becoming grayish on the sides of the sclerite; a dark brown median stripe beginning near the anterior end of the sclerite, becoming narrower and finally obsolete before the suture; scutum, scutellum and postnotum dark brown. Pleuræ dark brown, with a sparse gray bloom on the middle of the thorax. Halteres dark brown; remainder of femora, tibiæ and tarsi dark brown. Wings somewhat suffused with darker; a small oval brown stigma. Venation: (See fig. o.) Sc short, ending far before the origin of Rs , Sc_2 not evident. Rs rather short, about one and one-half times the length of the deflection of R_{4+5} ; cross-vein m present in the type, absent in the paratype.

Abdomen dark brown.

Holotype.—♀. Aguna, Guatemala, Cent. Am. (Dr. G. Eisen.)

Paratype.—♀. Same as the type.

Types in U. S. Nat. Mus. coll. (No. 15,139.)

Furcomyia knabi sp. n.

Like *liberta* O. S., but ventral lobe of ♂ hypopygium produced entrad in a long slender arm.

♂.—Length, 6.5–7 mm.; wing, 8.8–9.8 mm.

♀.—Length, 7 mm.; wing, 9 mm.

Head: rostrum and palpi dark brownish black; antennæ black. Front, vertex and occiput clear gray.

Thorax: dorsum of the mesonotal præscutum suffused with brown, general colour brownish gray, much browner than the clear gray of the head; stripes on thoracic dorsum ill-defined; scutum dull gray, the scutellum very light gray; postnotum gray. Pleuræ grayish. Halteres yellow, knob brown. Legs: coxæ and trochanters brown; femora, tibiæ and tarsi dark brown. Wings almost as in *liberta* O. S., not pallid at base; a faint stigma at the tip of R_1 . Venation: (See fig. m.)

Abdomen gray. Hypopygium: (See fig. w.) Dorsal aspect, 9th sternite very convex, ending in a small knob deeply bifid; pleuræ long, cylindrical, bearing two apical lobes; the dorsal lobe slender, chitinized, ending in an acute point; ventral lobe yellow, produced entad

into a long arm chitinized, its apex blunt but slightly notched. Ventral aspect, 9th tergite almost straight on caudal margin; pleuræ short, the inner caudal angle produced into a long appendage, which is tufted with yellow hairs at its tip; guard of the penis long, enlarged basally, projecting slightly beyond the apices of the pleural appendage; ventrad of the pleural arm is a slender acicular appendage.

Holotype.—♂. Totonicipan, Guatemala, 1902. (Dr. G. Eisen.)

Allotype.—♀. Antigua, Guatemala. (Dr. G. Eisen.)

Paratypes.—♂♂. Totonicipan, Guatemala. (Dr. G. Eisen.)

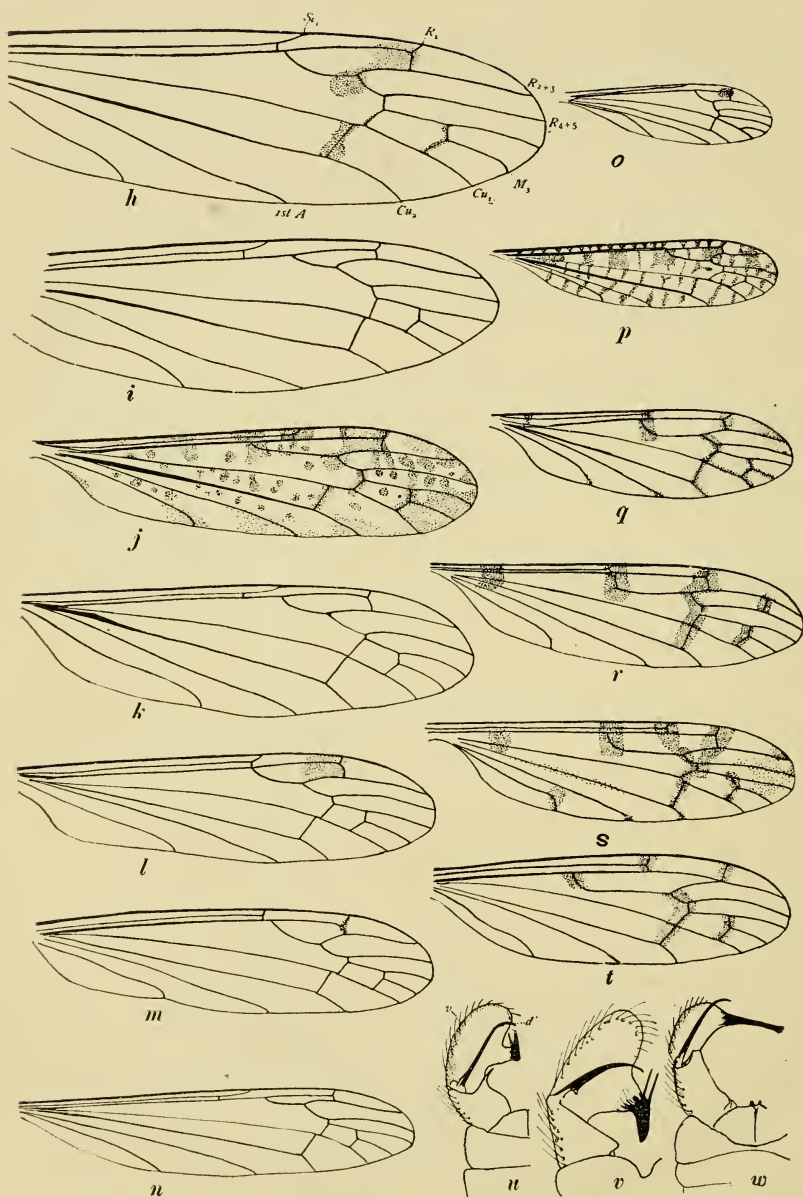
Types in U. S. Nat. Mus. coll. (No. 15,135). One paratype in author's collection.

Like *liberta* O. S. (Proc. Acad. Nat. Sci. Phil., 1859, p. 209; Monograph Dipt. N. Am., Vol. 4, p. 69), of the Eastern U. S., but larger, the mesothoracic præscutum browner and the stripes indistinct. In *liberta* the ♂ genitalia (fig. u) consists of short pleuræ, the swollen ventral lobes produced entad in a blunt knob, which bears two conspicuous caudad-projecting spines at its tip, the ventral one very stout, spine-like, the dorsal one more slender. In *knabi* the pleuræ are longer, the lobes short, the ventral one produced into a long arm, which is slightly notched apically.

EXPLANATION OF PLATE XI.

- Fig. h. Wing of *Furcomya andicola*, sp. n.
 " i. " *F. insignifica*, sp. n.
 " j. " *F. gloriosa*, sp. n.
 " k. " *F. argentina*, sp. n.
 " l. " *F. liberoides*, sp. n.
 " m. " *F. knabi*, sp. n.
 " n. " *F. simillima*, sp. n.
 " o. " *F. omissa*, sp. n.
 " p. " *F. reticulata*, sp. n.
 " q. " *F. osterhouti*, sp. n.
 " r. " *F. translucida*, sp. n.
 " s. " *F. eiseni*, sp. n.
 " t. " ? *F. fumosa*, sp. n.
 " u. Hypopygium of *F. liberta* Osten Sacken.
 v = ventral apical appendage.
 d = dorsal apical appendage.
 " v. Hypopygium of *F. liberoides*, sp. n.
 " w. " *F. knabi*, sp. n.

(To be continued.)



FURCOMYIA (TIPULIDAE, DIPT.).

THE INTERNATIONAL CONGRESS OF ENTOMOLOGY.

The Second International Congress of Entomology was held at Oxford (England), from August 5th to 15th, the first Congress having been held at Brussels in 1910. It was attended by representative entomologists from Australia, Belgium, Canada, Borneo, British East Africa, Chili, Egypt, France, Germany, Holland, Hungary, Luxembourg, Sandwich Islands, Spain, Sweden, Switzerland, Turkey and the United States, besides a large number from Great Britain and Ireland.

As representative of the Canadian Government and a delegate from the Entomological Society of Ontario, I sailed from Quebec on July 26th, but an unfortunate collision at sea necessitated my return and re-embarkation from New York, and on this account I missed the proceedings of the first day, during which the President, Prof. E. B. Poulton, F.R.S., delivered his presidential address.

In welcoming the entomologists of all nations, the President alluded to the suitability of Oxford as the meeting place of such a gathering, and referred to the celebrated meeting of the British Association in 1860 in the same place, when Huxley made his celebrated and crushing retort to Wilberforce's attempt to throw ridicule on the evolutionary doctrines recently set forth by Darwin and valiantly championed by Huxley. Prof. Poulton traced the history of the Hope Department of Entomology at Oxford, of which he has charge, and referred to the great work of Prof. Westwood, his predecessor and former teacher. He described a splendid exhibit of the polymorphic African *Papilio dardanus*. Tracing its geographical variations and illustrating the gradual development of mimicry by the female, the polymorphism of the same sex and the proportions of the different mimetic forms hatching out from the eggs of a single female.

The meetings of the Congress were general and sectional. At the various sectional meetings, which were usually held at the same time, economic and medical entomology, evolution and bionomics, mimicry and distribution, systematic entomology and nomenclature and morphology were discussed. It was naturally impossible for one to attend all the sections or to hear all the papers which one would have wished to hear. On this account, therefore, I shall refer only to certain of the papers which I was able to hear. In any case, space would forbid the writing of a more lengthy account, which will be given in the official reports of the Congress.

Mr. G. T. Bethune-Baker and Rev. G. Wheeler brought forward and discussed a proposal from the Entomological Society of London for the formation of the International and National Committees to deal with the

vexed and complicated question of nomenclature. The matter was wisely referred to the Executive Committee of the Congress for consideration and report. As a result of the Committee's report, the Congress decided upon the formation of an International Committee on nomenclature and of National Committees to be elected by the entomological societies. It was also resolved to request better representation for entomology on the International Committee on Zoological Nomenclature. In reply to a question as to what would be the result of a disagreement of the part of the newly-established International Committee on Entomological Nomenclature with the International Committee on Zoological Nomenclature, I was pleased to receive from Dr. Jordan, the General Secretary, the assurance that the finding of the Entomological Committee would prevail and would be accepted.

In the case of such a meeting, presided over by Prof. Poulton, and held in the Hope Department, which might well be called the home of the study of mimicry, it was natural that in the section on evolution and bionomics there should be presented some most interesting and valuable papers on mimetic resemblances, their evolution and distribution. Prof. Poulton described the researches of Mr. C. A. Wiggins and Dr. C. H. Carpenter on the forest inhabiting *Pseudacræas* of Uganda. The polymorphic character of the mimetic species has led to the creation of a number of species. Breeding experiments are throwing considerable light as to the relationships of the different forms. On the same subject Prof. Punnett read a very suggestive paper by Mr. J. C. F. Fryer, who is attempting to work out the polymorphism of *Papilio polytes* on Mendelian lines. Dr. R. C. L. Perkins discussed the colour groups of the Hawaiian wasps, in which the influence of a well-protected intruder upon the superficial aspect of the members of a native fauna is shown.

In the morphological section, Dr. F. A. Dixey read a paper on "The scent organs in the Lepidoptera." The specialized scales which serve to distribute scent in many species may be either generally scattered over the wing surface or collected in patches. In the latter case there is a special supply of air tubes to the sockets of the scales. Prof. G. H. Carpenter described the prescence of maxillulæ, small-paired appendages connected with the hypopharynx in certain beetle larvæ. Papers by Dr. G. Horvath (Budapest), Padre L. Navas (Barcelona), and Prof. J. Van Bemmelen (Gröningen), dealt with the morphology and phylogeny of insect wings. Mr. L. Doncaster (Cambridge), gave an account of his investigations on the question of sex-limited inheritance of characters in insects.

Papers on the geographical distribution of insects were read by Dr. Anton Handlirsch (Vienna), who ranged over the whole field of fossil insects, and Dr. P. Speiser (Labes), Baron von Rosen (München), discussed the forest Termites, while Prof. Calvert gave an exceedingly interesting review of the advance which has been made in the knowledge of the dragon-flies since 1895.

Among the papers on insect bionomics which were read, three may be specially mentioned, on account of their exceptional interest. Dr. W. M. Wheeler (Harvard), gave an account of his recent investigations in Central America in ten Acacia-inhabiting ants. His results do not confirm the popular idea as to the adaptation of the acacias for the purpose of encouraging ants with a view to protecting themselves against the leaf-cutting ants. The ants merely frequent the convenient hollow places in the acacias because it suits their convenience so to do. Dr. A. Seitz (Darmstadt), described the results of an interesting experiment which he devised to test the sense of sight of insects, in this case butterflies. The character of this sense may be judged from the fact that the male butterflies of the species observed were found to be so short-sighted that they attempted to copulate with paper-coloured replicas of the females mounted on pins. A masterly and extremely suggestive paper on the Mallophaga was read by Prof. Vernon L. Kellogg. It was demonstrated that the association between these parasitic insects and their avian hosts was of a most remarkable character, tending to show that the parasites had become associated with their present hosts before the latter had become divided into separate species. They showed to an extraordinary degree the effect of isolation brought about by specific association.

Before the sections for economic and medical entomology many valuable and important papers were read. Sir Daniel Morris read a paper by Mr. W. A. Ballou (Government Entomologist for the West Indies), on the more important insects of the West Indies and the methods adopted for their control. Prof. J. Jablonowski (Budapest), contributed two papers, one of which on the methods of fighting the locust, *Stauronotus maroccanus*, in Hungary was of unusual interest and importance from the Canadian point of view. Mr. A. G. L. Rogers (Board of Agriculture and Fisheries, England), contributed a paper on the necessary investigation with relation to insect pests preliminary to legislation. While the ideas set forth by the author were in the main sound, he made many assertions which were not borne out by facts. This was shown in the subsequent discussion, which proved so interesting that it was postponed until the following day, when a resolution was passed, and subsequently submitted

to and passed unanimously by the Congress, supporting the proposed formation of an International Commission by the International Institute of Agriculture at Rome to deal with the problems connected with the spread of insect pests. Prof. F. V. Theobald gave an account of his investigations in the Aphid genus *Macrosiphum*, a most valuable piece of work both to the systematist and to the economic worker. In the medical section, Prof. S. A. Forbes (Illinois), read a paper on *Simulium* and Pellagra in Illinois. The results of his enquiry do not, so far, lend support to the theory that this disease is transmitted by *Simulium* flies. A paper on the methods of combating *Musca domestica* led to a discussion on the subject, but no new facts were brought forward.

The social side of the Congress was not the least enjoyable feature of the meeting nor the least important. In the garden of Wadham College a private café was installed, where luncheon, tea and light refreshments were served. Here delegates from all lands were able to meet. The members of the Congress were entertained most hospitably at Nunham by the Rt. Hon. L. V. Harcourt, M. P., Secretary of State for the Colonies, and by the President and Fellows of St. John's College at Bagleywood, on August 7th. A banquet was held in the hall of Wadham College on August 8th, at which many but short felicitous speeches were made. On August 15th the members made a visit to Tring Park, where they were entertained by the Hon. Walter Rothschild and shown over his celebrated zoological museum and entomological collections.

The next Congress will be held in Vienna, in 1915, under the presidency of Dr. Anton Handlirsch, who will undoubtedly prove a most genial host.

Mr. Henry H. Lyman, of Montreal, also represented the Entomological Society of Ontario. Dr. E. M. Walker was elected an additional member of the Permanent Committee of the Congress.

C. GORDON HEWITT.

Dr. R. Matheson has been appointed Provincial Entomologist for Nova Scotia. The recent appointment of Mr. L. Caesar as Provincial Entomologist for Ontario and the appointment of Mr. W. H. Britton as Plant Pathologist and Entomologist for British Columbia are pleasing evidences of the fact that the Provincial Governments are realising the importance of applied entomology.

Dr. Matheson is a native of Nova Scotia and after studying at the

Provincial Agricultural College at Truro, N. S., he graduated at Cornell University, Ithaca, N. Y. Later he was appointed State Entomologist and Professor of Entomology at the Agricultural College for South Dakota. Two years ago he returned to Cornell University where he assisted on the staff of the entomological department, taking his doctor's degree last year. Dr. Matheson's training makes him well qualified for the position he now holds, and with the recent introduction of the San José scale, the presence of the Brown-tail moth and the occurrence of several other serious insect pests in Nova Scotia, he will find problems of importance and interest awaiting him.

C. G. H.

BOOK NOTICE

THE HUMBLE-BEE.—Its life-history and how to domesticate it, with descriptions of all the British species of *Bombus* and *Psithyrus*. By F. W. L. Sladen. 13-283 pp., 34 figs., 5 coloured plates (Macmillan). \$2.50.

"Everybody knows the burly, good-natured bumble-bee," the author states in his opening sentence, and while this is true, the author has shown, in giving us the results up to date of what has been a life-study, how little even the entomologist knows of these people of the hedgerows, whose homes he no doubt laid waste when a boy.

Roughly speaking, the book can be divided into three parts. In the first part the life-histories and habits of *Bombus* and of the parasitic usurper *Psithyrus* are described in full and in a fascinating manner, a manner which makes the general reader feel the intense interest of the real naturalist. We see the queen in her solitude anxiously choosing the site of the future nest and brooding over her eggs and young; then the gradual development of the little community. Some of the author's descriptions are the best we have read in entomological literature; one of these is the description of the death of the queen: "In the case of *B. pratorum*, and probably of the other species whose colonies end their existence in the height of summer, the aged queen often spends the evening of her life very pleasantly with her little band of worn-out workers. They sit together on two or three cells on the top of the ruined edifice, and make no attempt to rear any more brood. The exhausting work of bearing done, the queen's body shrinks to its original size, and she becomes quite active and youthful-looking again. This well earned rest lasts for about a week, and death, when at last it comes, brings with it no discomfort. One night, a little cooler than usual, finding her food supply exhausted, the queen grows torpid, as she has done many a time before in

the early part of her career ; but on this occasion, her life-work finished, there is no awakening."

The interesting and important discoveries which the author made as to the parasitic nature of the *Psithyrus* form a valuable portion of the first part of the work. We are told how the *Psithyrus* queen, protected by her coat of mail, impervious to the attacks of the *Bombus* queen, enters the home of the latter, and, after treacherously killing her, makes slaves of the workers, as she herself neither produces workers nor is provided with the pollen-collecting baskets in her hind legs.

The second part of the book describes the author's experiments in domesticating the *Bombi*, in which many types of domiciles were used. This section will prove of great value to future workers on the same lines. We should point out, in passing, that there is undoubtedly an important field of investigation in the encouragement of the *Bombi*. The economic significance of the presence of these insects where clovers are grown is now more generally appreciated, but we are not aware of any efforts having been made for the encouragement of these fertilizing agents. It is proposed to carry out in Canada investigations of the nature indicated.

In the third section of the book all the British species of *Bombus* and *Psithyrus* are described. Not only is a clear description of the queen, worker and male of each species given, and a brief description of their habits as observed by the author, but coloured illustrations render the identification of the species possible to anyone. The coloured figures, and there are five plates of them, are photographed direct from the specimens, and are undoubtedly the finest specimens of this kind of work which we have seen. The work is further enriched by the author's own drawings and photographs. The author has demonstrated, we believe for the first time, the importance of the structure of the male genitalia in separating the species and groups of species. The great variations in colour render such a method of separation of greater importance and significance. Illustrations are given of the male genitalia of the British species.

Although the author has confined himself to specific descriptions of the British forms, the book is none the less valuable to entomologists on this side of the Atlantic. From a monographic standpoint alone it is a work which should find a place on the bookshelf of every entomologist whose desires are not confined to the killing bottle and cabinet, but sit, like the fairies, astride the velvet-backed bumble bee and sail along the hedgerow, over field and forest and into every nook where insect creeps.

G. GORDON HEWITT.

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NEW SPECIES OF THE FAMILY IPIDÆ (COLEOPTERA).

BY J. M. SWAINE,

Assistant Entomologist for Forest Insects, Division of Entomology, Ottawa.*

An undescribed species of the genus *Trypophloeus* was recently received from Weymouth, N.S. Mr. G. E. Sanders, who collected the material, has found the species in the vicinity of Weymouth only, in dying stems and twigs of *Alnus*.

This species is closely related to *T. alni* Lind., of Russia, which breeds in the bark of *Alnus incana* but is distinguished by its shorter wing covers, coarsely punctured but not granulate hinder half of the pronotum, and unimpressed elytral striæ.

Trypophloeus nitidus, n. sp.—Black (when matured); length, 2 mm.; width, $\frac{3}{4}$ mm.; clothed with short, inconspicuous, grey hairs of two lengths; pronotum small, from above subtriangular; elytra with rows of punctures, interspaces finely, confusedly punctured; the whole body shining.

The *head* is subglobular, punctured rather variably with coarse, very shallow punctures and faintly aciculate behind the eyes; the whole head often reticulate from very minute, dense, shallow punctures; the front more coarsely, closely, and rather roughly punctured. A median, longitudinal impression extends down the front and ends in a V-shaped impression at the base of the epistoma. The front is rather sparsely clothed with short, gray hairs. The epistoma, which bears a few long, yellowish hairs, is widely margined, shining and produced at the median line into a broad lobe, the upper surface of which is distinctly concave. The eyes are wide, coarsely granulated, slightly emarginate in front. The antennal fossa is small, rounded, and lies in the very short space between the eye and the base of the mandible. The antennal scape is strongly curved and clavate; the first segment of the funicle is large and pedunculate, the remaining four segments saucer-shaped and rapidly widened. The club is elongate, narrowed distally, and truncate, with three transverse sutures, of which the third is indistinct. The sutures are more densely hairy on the outer side, on the inner side the first suture is sometimes incomplete. The outer surface of the truncate tip bears a large, stout seta at each end.

*Contributions from the Division of Entomology, Ottawa.

The *pronotum* is subtriangular in outline; as wide as the elytra; with the base broadly rounded and finely margined; the hind angles broadly rounded; the sides sinuate, swollen behind, strongly convergent cephalad, and the apex not very narrowly rounded. The apical margin bears two larger recurved points on the median line, with two or three smaller ones on each side. The asperations of the front half of the pronotum are strong, wider and more strongly compressed towards the centre and concentrically arranged. The caudal half of the pronotum is coarsely, densely punctured, with a few very fine punctures intermixed, but is not granulate. The hairs of the pronotum are short, fine, and point towards the summit.

The *scutellum* is triangular, distinct, not depressed, closely and coarsely punctate, and surrounded by a narrow, transversely rugose area.

The *elytra* are slightly over twice the length of the pronotum, 16:7, with the sides parallel as far as the level of the top of the declivity, then gradually rounded and narrowed to the narrowly rounded tip. The elytra are punctured in rows, the striae hardly impressed, with the interspaces confusedly punctured with very fine punctures and with a row of widely separated, slightly larger punctures which bear long, stout bristles. The punctures of the strial rows are round, small at the bottom, large at the surface, deeply impressed individually, so that the surface is somewhat transversely wrinkled. The pubescence is short on the disc, longer and more conspicuous on the sides and declivity. The interspaces bear each a row of longer, stout bristles, with minute, slender setae irregularly placed. The declivity is convex, with the striae distinctly impressed.

The front coxae are prominent and contiguous. The prosternum is short, with a sharp, slender, intercoxal process. The metasternum is longitudinally sulcate on the median line. The hind coxae are very elongate and sharp-pointed distally. The foretibiae are strongly widened distally, the inner margin strongly sinuate, the outer margin straight on the distal half and finely serrate.

Can. Div. Ent. Col., No. 2087; Weymouth, N.S.; *Alnus incana*.

Dryocoetes pubescens, n. sp.—This species is represented in our collection from Colorado. It is allied to *affaber* Mannh., but is distinctly more elongate, with the elytra more densely and coarsely punctured on the declivity.

The front of the female is densely clothed with long yellow hairs, shorter at the centre; with a smooth median space extending over the vertex. The front in the male is rather roughly granulate-punctate, thinly clothed with long hairs, with a distinct, smooth median space extending from a moderate pit in the centre of the front caudad to the vertex, very narrow at first and wider behind.

The *pronotum* is much as in *affaber* Mannh., widest behind and narrower towards the front; the sides usually curved, but sometimes nearly straight for a short distance. The pronotum of both sexes is more distinctly granulate than in the male of *affaber*; the whole upper surface is strongly granulate. The prothorax is margined behind.

The *elytra* are very closely, deeply and coarsely punctured in rows. The striae are not impressed, and the punctures of the interspaces are as large and about as numerous as those of the striae. The punctures of the first interspaces are confused behind. The declivity has the first two striae impressed, as usual, but the suture is not raised, so that the declivity appears from above as quite distinctly flattened. The punctures of the declivity are coarse and very numerous. The densely and coarsely punctured declivity distinguishes this species from others described from North America.

The pronotum and elytra are rather densely clothed with long, erect, yellow hairs.

The type bears the labels; Col., Cornell U., lot 302, sub. 37. 189, type ♀.

Dryocoetes confusus, n. sp.—Length, $3\frac{1}{2}$ mm. Dark red to nearly black, front densely hairy, and elytral interspaces confusedly punctured; pubescence long, erect, straight, and rather dense on the pronotum and on the elytra.

The front of the female is almost entirely covered with a very dense, circular brush of short, yellow hairs, with the marginal hairs longer and thicker; a fine median carina is visible. The frontal hairs are very much denser than in *eichoffi* Hopk. The front of the male is densely, coarsely, roughly punctate and sparsely clothed with long hairs, with a shallow impression below and a fine medium carina above. The eyes are emarginate and the antennal club obliquely truncate as usual.

The *pronotum* is slightly longer than wide, widest behind the middle, about as wide as the elytra, gradually narrowed cephalad of the posterior third, broadly rounded in front and very broadly rounded behind. The entire surface is roughened, but the asperations are finer and closer behind the middle. The smooth median line is nearly obsolete. The pronotum is sparsely pubescent, with long hair on the sides and in front, and the disc nearly glabrous.

The *elytra* have the sides nearly parallel, slightly wider behind, with the declivity somewhat flattened from the depth of the first two striae. The striae of the disc and sides are hardly impressed except the sutural striae which are rather distinctly impressed,

and convergent towards the base. The stria punctures are moderate to rather coarse, close, and at times somewhat irregular towards the declivity. The interspaces are wide, with the punctures nearly as large as those of the striae, and irregular, except that the first three are uniseriately punctured towards the base. The interspaces are granulate on the declivity. The sutural interspaces are convex throughout. The elytra are rather densely pubescent, more noticeably so on the declivity.

Cornell University Collection; Colorado. The type bears the labels; Cornell U., no. 302, sub. 35, Col., 18, ♀.

Dryocoetes minutus, n. sp.—Length, $1\frac{3}{4}$ – $2\frac{1}{4}$ mm.; width, $\frac{2}{3}$ – $\frac{3}{4}$ mm.; a small slender species, nearly black, with legs and antennae lighter.

The front is densely granulate-punctuate, clothed with long, rather dense, yellow hair, less dense than in the female of *eichhoffi* Hopk. Probably one sex only is represented. There is a faint, traverse, linear impression across the middle of the front at the level of the upper part of the eyes, and a small, central, frontal tubercle. The eyes are slightly emarginate. The first segment of the antennal funicle is larger than usual, and the club truncate and strongly compressed.

The *pronotum* is distinctly longer than wide, with the hind margin very broadly rounded; the hind angles distinct; the sides nearly parallel from the base to beyond the middle, then regularly rounded in front; cephalic half punctured and rather coarsely asperate, caudal half coarsely punctured on the disc, punctures nearly as large as those of the elytral striae, and with minute asperations on the sides; rather densely clothed with short yellow hair, longer in front and very short on the disc.

The *elytra* are slender, much longer than the pronotum, with distinctly impressed striae of medium, close, rounded punctures; the sutural striae more strongly impressed, parallel, more closely punctured; the interspaces wider than the striae, flattened, rather sparsely, uniseriately punctured and pubescent, with the punctures smaller than those of the striae on the disc, but on the sides as large as those of the striae, and granulate towards the declivity. The declivity is convex, rapidly narrowed, compressed towards the apex, with the sutural striae deeply impressed and the sutural interspaces granulate; the other striae not impressed, and the striae and interstriae punctures equal, confused, and granulate. The pubescence is much denser on the declivity.

The fore tibiae are strongly widened distally, with four very long teeth on the distal half of the outer margin.

Type from Colorado, in the Cornell University collection; lot 302, sub. 94, 130.

Ips pilifrons, n. sp.—Length, $4\frac{1}{2}$ –5mm.; width, $1\frac{7}{8}$ mm. Larger and stouter than *pini*, with the sutures more strongly angled, the elytral striæ impressed, the elytral interspaces punctured, the front with a dense mass of short hairs, and the declivital armature of the *pini* type. Color, dark reddish to nearly black.

The front of the female is convex, granulate above and in front of the eyes, punctured on the sides, with a swollen area in front presenting a flat, oblique, anterior surface, which is covered with a circular, dense mass of short, yellow or brownish hairs. The front of the male has the pubescent area of the female replaced by a convex densely granulated area, moderately pubescent, with long yellowish hairs. The antennal club has the first suture bisinuate, the second sharply angled in front, not prolonged, the third suture angled but often indistinct, and the sutures strongly recurved at the sides.

The *pronotum* is shorter than the elytra, 2: $2\frac{1}{2}$; longer than wide, 2: $1\frac{2}{3}$; broadly rounded behind; slightly rounded on the sides, and gradually narrowed cephalad or subparallel for over three-fourths the length, then rapidly narrowed and rounded in front; with the disc rather coarsely roughened in front; coarsely and deeply punctured behind, but not very densely except on the sides, and clothed with light slender hairs on the sides and in front.

The scutellum is very small and distinctly channelled. The *elytra* are punctate-striate, with the striæ distinctly impressed and wider on the disc; the punctures of the discal striæ large, deep, subquadrate, and usually closely placed; the punctures of the lateral striæ usually distinctly smaller than those of the disc, and near the lateral margin sometimes easily confused with those of the interspaces, which are there small, numerous, and irregular; the sutural striæ deep, variably widened towards the declivity; the interspaces convex, with setigerous punctures, smaller than those of the striæ, usually extending from the base to the declivity; the punctures of the first two interspaces rather closely placed; those of the third, fourth and fifth more distant, except near the declivity; the first two interspaces with granules which become much larger near the declivity, with smaller granules intermixed; the remaining interspaces from the sixth outward confusedly punctured and granulate at the declivital margin. The *declivity* is deeply excavated, coarsely and confusedly punctured, not pubescent, with the sutural interspaces raised and the elytra dehiscent at the tip. The declivital teeth are coarser than in *pini*, and the acute apical margin is usually more strongly produced. The elytra are clothed with light, soft hairs, rather dense along the sides, around the margin of the declivity, along the base and along the suture, but sparse on the central areas of the elytra.

The type is from the Cornell University Collection. Colorado; ♀.

CANADIAN BEES IN THE BRITISH MUSEUM

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The bees in the British Museum are now being rearranged by Mr. G. Meade-Waldo, who has sent me for determination a number of species, some of them Canadian. In recording them, I give the accession numbers, which show when they were received at the museum. Thus, 99-303 means accession 303 of the year 1899. It will be seen that the three species of *Osmia* here introduced as new were received at the museum in 1844, more than 20 years before the birth of their describer. Other species were received at the museum long before they were described in this country.

Megachile femorata Smith.—♂, Canada, pres. by Mrs. Farren White, 99-303. ♂, Canada, 59-130. Smith's *femorata* is usually regarded as a synonym of *M. latimanus* Say, but Titus has treated it as a distinct species. If it is to be separated, the form with hardly any dark color on the anterior tibiae, and the coxal spires stout, must be referred to *femorata*, while *latimanus* male has approximately the basal half of anterior tibiae on outer side black and the coxal spines more slender. According to this separation, the usual Rocky Mountain insect is *latimanus*, but I have a male *femorata* from as far south as Las Vegas, New Mexico (at flowers of *Asclepias verticillata*; W. Porter). It seems probable that the two insects do not represent distinct species.

Megachile latimanus Say.—♂, British Columbia (Miss Ricardo) 1903-134. ♂, Calgary, Canada (Miss Ricardo), 1902-55. These females differ from the ordinary form by the distinctly longer black hair on the dorsal surface of the abdomen. They look a little like *M. vidua*, but are readily separated by the densely punctured mesothorax and the light hair of last dorsal abdominal segment.

Megachile wootoni Ckll.—♀, Calgary (Miss Ricardo), 1902-55. ♂, Calgary, with same data. ♂, Arctic America, 55-42.

Megachile melanophaea Smith.—♂, Hudson's Bay, 44-17.

Megachile relativa Cresson.—♂, Chulukwayuk trail, British Columbia, Aug. 1859.

Megachile vernonensis, n. sp.—♀, Length, about 11 mm.; black, with long dull white hair; antennae not enlarged at apex; eyes green; anterior coxae with short but well-formed spines, largely hidden by hair; anterior femora broad, smooth, concave and ferruginous beneath, above with a rather obscure red patch; hair on inner side of tarsi pale orange; sides of vertex with black hair, but none on thorax above; apical carina of sixth abdominal segment with a large rounded (semicircular) emargination, the margin on each side of it jagged with short irregular teeth;

morphological apex of sixth segment with four short dentiform projections, the middle ones not quite so near to one another as to the lateral, the margin between the middle ones convex. Almost exactly like the male of *M. cleomis* Ckll., but differing in the apex of sixth segment (*cleomis* has the middle teeth considerably nearer to one another than to the lateral, and the margin between them concave), and in having the densely granular concave upper surface of sixth segment so feebly white-tomentose that the tomentum is only visible in lateral view (*cleomis* has this part densely tomentose); the hair of the face has a creamy tint, instead of being clear white as in *cleomis*. The lateral ocellus is a trifle nearer to edge of vertex than to nearest eye.

♀.—Length, 11 mm.; mandibles 4-dentate, reddish apically; eyes light green, narrow; clypeus shining, closely punctured, its lower margin straight, a transverse depression above the margin; vertex with brown hair; abdomen with white hair-bands; sixth segment sloping (not concave) in profile, with coarse black hair, its apical third with very fine white tomentum; ventral scopa white, entirely black on last two segments. Very like a small *M. cleomis*, but distinguished by the wholly black hair on last two ventral segments, the narrower eyes, and the last dorsal abdominal segment as described. Also near to *M. generosa* Cress., but considerably smaller, and with the same distinctive characters as those separating it from *cleomis*. *M. anograe* Ckll., another similar species, is at once separated by its brilliantly shining sixth abdominal segment, with coarse black hair to the apex.

In Friese's table (Das Tierreich) the female runs nearest to *M. addenda*, but Robertson describes *addenda* as having the margin of clypeus denticulate, while only the last ventral segment of abdomen has black hair. The male runs best to *M. texana*, i.e., Cresson's male *texana* which appears to be *cleomis*.

Hab.—Vernon, British Columbia (Miss Ricardo). The type (male) taken July 7, 1902; the female, Aug. 18, 1902. This is possibly to be considered a subspecies of *M. generosa*, but with the evidence available it seems a distinct species.

Megachile montivaga Cresson.—♂, N. Ontario, Canada (H. Edwards), 89–113.

Megachile vidua Smith.—♂, British Columbia, 60–112. The specimen is unusually large.

Dianthidium pudens (Cresson).—♀, British Columbia, 60–112. Described from Nevada.

Osmia novaescotiae, n. sp.—♀, Length, about 9 mm.; head rather large, dark steel-blue, densely, punctured; mesothorax and scutellum more tinged with greenish but pleuræ and metathorax dark blue; abdomen short, broad-oval, shining steel-blue; hair of

head greyish-white, pale fuscous on middle of face; hair of thorax white, with a creamy tint above, and no dark hair intermixed; tegulae piceous, with a greenish spot in front; wings dusky hyaline, reddish, distance from base of first s.m. to insertion of first r.n. as great as length of first t.c.; b.n. going just basad of t.m.; legs reddish black, not at all metallic, with pale pubescence, reddish on inner side of tarsi; abdomen closely but rather shallowly punctured, the punctures going nearly to the margins of the segments; sub-lateral region with quite long black hair; ventral scopa black. The clypeal margin is entire, and the mandibles are 3-dentate; the area of metathorax is densely granular basally, but more shining apically.

Hab.—Nova Scotia (Ent. Club), 44–12. I have been much perplexed to decide whether this could be the female belonging to the male from Nova Scotia described as *O. simillima* by Smith. This may indeed be the case, but the type of *simillima* must be considered to be the female, which may not be conspecific with the male. Smith says that the female *simillima* is so like the European *O. caerulescens* that it is difficult to distinguish; but *novaescotiae* is easily separated from *caerulescens* by the broader, less deeply punctured abdomen, without white marginal fringes or bands. In our fauna it is *O. purpurea* Cresson, which closely resembles *caerulescens*.* In my brief notes on Smith's types, I observed that according to Robertson's tables the female type of *simillima* was an *Osmias* str., while the male was a *Monilosmia*. Dr. Graenicher has, however, obtained at Milwaukee, Wisconsin, what he regards as true *simillima*, and has both sexes from the nest. The male of this species is a *Monilosmia*, but the female has a black ventral scopa and clypeus with entire margin, quite contrary to Robertson's definition of *Monilosmia*. The Milwaukee females are larger than *novaescotiae*, with a dark greenish abdomen, and the hind margins of the segments more broadly smooth. They are very unlike *O. caerulescens*. They have the hair on inner side of middle tibiae black; in *novaescotiae* it is pale, with a reddish tint. The b.n. goes more broad of the t.m. than in *novaescotiae*. There is no doubt, I think, that the Milwaukee "*simillima*" is distinct from *novaescotiae*, but I find that except for the smaller amount of dark hair on the head (a variable character) it is scarcely or not to be separated from the western *O. densa* Cresson. This probably explains why we have never been able to find a male for *densa*;

*Can it be that *O. purpurea* is *caerulescens*? From the British Museum I have a female marked North America, 40, 4-2, 484, and it is quite impossible to distinguish it from European *caerulescens*, while, at the same time, it agrees with Cresson's description of *purpurea*. It has the shiny metathoracic area of *caerulescens*, which Smith expressly says is wanting in *simillima*.

it is doubtless of the *Monilosmia* type. *Osmia chlorops* Ckll. and Titus, which occurs in the same localities as *densa* (e.g., at Florissant), and like it visits *Pentstemon*, is doubtless the male of *densa*. It is hardly different from the Milwaukee "*simillima*."

O. novaescotiae, compared with a number of species which have white hair on the pleura in the female, differs (1) from *albolateralis* by the deep blue (not green) abdomen, total absence of black hair on vertex, etc.; (2) from *coloradella* by the non-metallic legs, abdomen seen from above showing black hair projecting at sides, etc.; (3) from *densa* by absence of black hair on front, blue abdomen, etc.; (4) from *dubia* by the shining middle of mesothorax, largely pale hair on legs, and blue abdomen; (5) from *faceta* by the simple clypeus, etc.; (6) from *felti* by the much smaller size, dorsal abdominal segments sculptured almost to apex; (7) from *melanotricha* by the blue, more densely sculptured abdomen, and absence of black hair on vertex; (8) from *pentstemonis* by absence of coarse black hair on head and vertex; (9) from *phaceliae* by absence of black hair on vertex and scutellum, and blue abdomen.

Osmia subarctica n. sp.—♀, Length, nearly $7\frac{1}{2}$ mm.; dark steel-blue, the femora and tibiae metallic, the tarsi piceous; head rather large, densely punctured, clypeus and sides of face a fine dark blue; clypeal margin entire; mandibles tridentate; flagellum obscure ferruginous beneath; hair of clypeus black, but of sides of face white; hair of vertex pale, but front with a slight intermixture of fuscous hairs; hair of thorax entirely rather dull white; mesothorax and scutellum closely punctured, but shining; area of metathorax dull and granular; tegulae dark rufopiceous, blue in front; wings dusky hyaline; b.n. exactly meeting t.c.; hair of legs largely black, brown-black on inner side of tarsi; abdomen moderately shining, with shallow sculpture, dorsally with extremely short and scanty hair, white at sides; no hair-bands; ventral scopa black, with coppery tints.

Hab.—Hudson's Bay, 44-17. Closely related to *O. pentstemonis* Ckll., but separated by the absence of dark hairs on thorax above, and the less shining abdomen. It is perhaps not more than a subspecies of *pentstemonis*, but I have a series of the latter, all looking different from *subarctica*. *O. subarctica*, compared with other species having white hair on the pleura of the female, differs thus: (1) From *albolateralis* by the metallic legs, much smaller size, etc.; (2) from *coloradella* by dark hair of middle of face, etc.; (3) from *densa* by the metallic legs and much smaller size; (4) from *dubia* by the metallic legs, etc.; (5) from *faceta* by the much smaller size, simple clypeus, etc.; (6) from *felti* by the much smaller size and metallic legs; (7) from *melanotricha* by the metallic legs, absence of long black hair in sublateral region of abdomen, and narrower head;

(8) from *phaceliæ* by the metallic legs, absence of black hair on scutellum, and narrower head.

Osmia atriventris Cresson.—♂. Ent. Club, 44-12. The accession number is the same as that of *O. novæscotiæ*, but there is no locality label.

Osmia tersula, n. sp.—♂, Length about $8\frac{1}{2}$ mm.; head and thorax densely granular-punctate, very dark green, with abundant long, wholly pale hair, slightly creamy-tinted on thorax above and head; mandibles stout, strongly curved, bidentate, the teeth subequal; face narrowing below; antennæ entirely dark, moderately long, not moniliform; area of metathorax blue-black, dull, granular; tegulæ piceous, punctured; wings dusky hyaline, b. n. meeting t.m.; second s.m. unusually long and low; legs brown-black, the femora and tibiæ not metallic, their hair long and pale, yellowish on inner side of tarsi; middle tarsi simple; hind basitarsi toothed; abdomen shining, very dark blue-green, the hind margins of the segments obscurely reddish; basal segment with long, pale hair; apical segments with conspicuous, long hair, wholly pale; middle segments almost hairless; no hair bands; venter with pale hair; margin of sixth segment with a shallow notch; seventh emarginate, hardly bidentate; first ventral entire; third ventral with an orange tuft or pencil of hair on each side of emargination.

Hab.—Hudson's Bay, 44-17. Distinguished especially by its dark color and toothed hind basitarsus. In Schmiedeknecht's table of European species it runs close to *O. panzeri*, but differs entirely in the antennæ and the pubescence. It may also be compared with *O. angustula*, which is smaller, with quite different pubescence. In our fauna there is closer resemblance to several species of the Rocky Mountains. The following table separates it from some of these:

Hair of vertex partly dark.....	1
Hair of vertex wholly pale.....	2
1. Scutellum with a median smooth line; teeth of mandibles subequal.....	<i>pulsatillæ</i> Ckll.
Scutellum without a smooth line; apical tooth of mandibles very long.....	<i>vallicola</i> Ckll.
2. Abdomen shining blue; seventh segment very strongly bidentate.....	<i>wheeleri</i> Ckll.
Abdomen dark greenish; seventh segment emarginate.....	<i>tersula</i> Ckll.

From *O. tersula*, *O. amala* Ckll. differs at once by the bright blue abdomen and much larger antennæ; *O. enena* Ckll. by the blue abdomen, strongly bidentate seventh abdominal segment, and broader face; *O. seneciophila*, by the abundant black hair on apical part of abdomen.

NOTES ON SOME CANADIAN BEES

BY J. C. CRAWFORD, WASHINGTON, D. C.

The specimens here recorded are part of a collection made at Medicine Hat, Alberta, by Mr. J. R. Malloch, between September 1st and October 15th, 1911. Other species of bees, which have not been studied, were also collected.

Agapostemon viridulus Fabr.—2♂.

Bombus huntii Greene.—1♂, 1♀.

Calliopsis coloradensis Cress.—6♂, 1♀.

Diadasia diminuta Cress.—1♂.

Dialictus anomalus Robt.—3♂, 1♀.

Halictoides marginatus Cress.—2♂, 2♀.

Halictus aberrans Cwfd.—1♂, 2♀.

Halictus lerouxii Lep.—8♂, 4♀.

Halictus provancheri D.T.—3♂, 1♀.

Halictus pruinosiformis Cwfd.—5♂, 4♀.

Halictus pruinosus Robt.—3♂.

Neopasites illinoiensis Robt.—1♂, 2♀.

Panurginus innuptus Ckll.—1♂, 1♀.

Perdita cockerelli Cwfd.—2♂, 1♀.

Perdita citrinella Grænicher—1♂, 2♀. Both the females have the hind tibiæ darkened. In one female the first recurrent vein is interstitial; in the other it is received by the first submarginal cell as in a paratype of the species.

Sphecodes minor Robt.—2♀.

Phileremulus mallochi, new species.—Male: Length, 3 mm; head and thorax black, closely punctured (but the sculpture concealed by the pubescence), closely covered with white appressed pubescence, that on the dorsum of the thorax slightly tinged with yellowish; abdomen red, disks of segments 4–6 more or less suffused with dusky; apical margins of segments 1–6 with bands of white appressed pubescence, disk of first segment with similar pubescence; labrum and mandibles, except the reddish tips, testaceous; scape and pedicel black, rest of the antennæ reddish; axillæ produced, tooth-like; tegulæ dark, the outer edge at middle obscurely reddish; scutellum bilobate at apex; metanotum medially strongly produced into a bilobate process; propodeum with a roughened basal triangular area without pubescence and with a strong median longitudinal carina; wings hyaline, marginal cell squarely truncate at apex; submarginal cell appendiculate at apex, receiving the recurrent vein slightly apicad of the middle; femora dark, tibiae and tarsi yellowish more or less suffused with dusky and the apical joints of the tarsi dark; abdomen rugoso-punctate.

December, 1912

Habitat.—Medicine Hat, Alberta, Canada. One specimen collected by Mr. J. R. Malloch. Type Cat. No. 15212, U.S.N.M.

This species in general appearance, very closely resembles *Neolarra pruinosa*, but in addition to the generic differences, differs also in the dark tegulae, the carina on the propodeum more elevated, the appressed pubescence not covering the abdomen, etc. *P. vigilans* and *P. nanus* are both smaller, with light coloured tegulae and with the appressed pubescence covering abdomen; *P. vigilans* also has the carina on the propodeum indicated at base only, the process on metanotum only indicated, etc.

Perdita canadensis, new species.—Female. Length about 9 mm. Head blue-green, thoracic notum green, pleurae blue-green; clypeus and labrum black, the former with purplish tinges, smooth, with a few fine punctures and produced anteriorly of a line connecting the lower ends of eyes fully one-third the length of the distance between eyes at lower ends; face without markings; antennae dark, scape with a narrow yellow line, apical joints of flagellum reddish beneath; pubescence of head and thorax long, erect, strongly tinged with ochraceous; collar with two small yellow spots; tubercles dark; wings milky white; veins hyaline; the stigma and costal vein light brown; first recurrent vein interstitial or almost so; legs dark, anterior knees and a short narrow stripe on anterior tibiae yellow; pubescence on outer side of legs greyish, on inner side ochraceous, on tarsi reddish; first abdominal segment with a small yellow spot on each side; segments 2-5 with yellow bands, the ends of which are turned caudad on segments 3-5; band on second segment dilated laterally so that the posterior margin is diagonal; bands on segments 2-3 notched medially on posterior margin; pygidium broad at apex with the apical margin emarginate.

Habitat.—Medicine Hat, Alberta, Canada. Two females collected by Mr. J. R. Malloch. Type Cat. No. 15213, U.S.N.M.

This species belongs to the group with *albipennis* Cresson, *lacteipennis* Swenk and Cockerell, and *pallidipennis* Gränicer; it differs from all of them in the dark face and other markings; *albipennis* and *pallidipennis* have the first recurrent vein received by the second submarginal cell and the pygidium rounded apically; *albipennis* has the clypeus produced hardly half as much as *canadensis*; *pallidipennis* has it produced about as much; *lacteipennis* has the clypeus produced about as in *albipennis* the first recurrent vein received by the second submarginal cell and the pygidium emarginate at apex. Of the value of this last character I am at present doubtful.

NEW SPECIES OF *FURCOMYIA* (*TIPULIDÆ*).

BY CHAS. P. ALEXANDER, ITHACA, N. Y.

(Continued from page 341.)

Furcomyia libertoides, sp. n.

Closest allied to *liberta* O. S. of the Eastern U. S., but differs as follows: The præscutal stripes are not clearly defined, the middle of the dorsum being suffused with bright brown; tergum of abdomen brownish, not clear gray; wings with the stigma conspicuous, rectangular, not a narrow seam to cross-vein *r*. Hypopygium from above—see fig. 5.). The pleural piece triangular, the ventral apical appendage fleshy, its inner margin produced into a point which is directed cephalad; two short spines about equal in size, projecting caudad on the middle of this appendage; dorsal arm, or apical appendage, rather short, gently curved. Venation, fig. 1.

Length about 6.5–7.5 mm.; wing, 8.7–8.8 mm.

Holotype.—♂. Marin Co., Cal.; March 23, 1897.

Paratypes.—♂s 5. With the type.

The material is part of the Wheeler collection; one paratype in author's collection.

Furcomyia sinillima, sp. n.

Yellowish thorax, with a dark brown median stripe; halteres very long.

♂.—Length about 5.5 mm.; wing, average, 6.8 mm.

♀.—Length about 5.8 mm.; wing, average, 7.4 mm.

Head: rostrum and palpi dark brown. Antennæ, first segment dark brown, thickly gray pruinose, remaining segments dark brownish black. Front, vertex and occiput brown, thickly gray pruinose, producing a gray effect.

Thorax: cervical sclerites dark, almost black; pronotum light dull yellow, dark brown along the dorsal median line. Mesonotum bright brownish yellow, becoming grayish on the sides; a broad dark brown median stripe continued from the pronotum, ending just before the suture; lateral stripes indistinct, grayish brown, beginning behind the pseudo-suture, continued across the suture and suffusing the lobes of the scutum; median line of the scutum and the scutellum paler yellowish white; postnotum brown; metanotum light yellow. Pleuræ light yellow, becoming grayish toward the metapleuræ. Halteres very long, extreme base yellowish, rest dark brown. Legs: coxæ and trochanters yellowish; femora yellow becoming somewhat darker apically; tibiæ and tarsi

yellowish brown. Wings subhyaline; no stigmal spot; veins yellowish brown. Venation: (See fig. n.) Sc ending before origin of Rs, Sc₂ far before tip so that Sc₁ is long, somewhat shorter than Rs; basal deflection of Cu₁ before the fork of M.

Abdomen: tergum yellowish brown, apices of the sclerites narrowly paler; sternum light yellow.

Holotype.—♂. Totonicipan, Guatemala. (Dr. G. Eisen.)

Allotype.—♀. Antigua, Guatemala. (Dr. G. Eisen.)

Paratypes.—11 ♂s, 8 ♀s. Quichi (July, 1902); Antigua and Totonicipan (July, 1902); Guatemala.

Types in U. S. Nat. Mus. coll. (No. 15,134.) Paratypes in author's collection.

Resembles *particeps* Doane (Ent. News, Jan., '08, p. 7), from north-western U. S., but head is more gray, abdomen much lighter coloured and the thoracic stripes different.

Furcomyia andicola, sp. n.

Head gray; thorax brownish yellow; wings with scanty brown marks.

♀.—Length, 8.1 mm.; wing, 11.2 mm.

♀.—Head: rostrum and palpi dark brown. Antennæ, basal segments brown, flagellar segments very dark brown. Front, vertex and occiput gray.

Thorax: pronotum dull yellow, the dorsum indistinctly suffused with brown. Mesonotum dull brownish yellow, a broad brown median stripe and shorter, less distinct lateral ones; scutum reddish brown, suffused with darker brown; scutellum and postnotum brown, with a grayish brown bloom. Pleuræ dark brown. Halteres, stem greenish at base, darkening to brown at the tip. Legs: coxæ greenish, femora brownish yellow, the tip clearer yellow; tibiæ light brown, darkened at tip; tarsi brown. Wings subhyaline, veins brown, C, Sc and R, more yellowish; a large, rectangular brown stigma, which is continued back over the fork of Rs as a rounded spot; narrow brown seams on the cord and outer end of cell 1st M₂. Venation (see fig. h.): Sc ending just beyond origin of Rs; Sc₂ removed from the tip so that Sc₁ is rather more than half as long as Rs; Rs about one and one-half the length of the deflection of R₄₊₅; basal deflection of Cu₁ before the fork of M.

Abdomen: tergum and sternum brown, the apices of the sclerites yellowish. It is probable that, in life, the insect is quite greenish.

Holotype.—♀. San Antonio, Bolivia. (Received from Staudinger-Bang-Haas.)

Type in author's collection.

Agrees most closely with *phatta* Phil., which has the thorax gray and the wing-pattern very different, three black spots in cells 1st R_1 and 2nd R_1 .

Furcomya insignifica, sp. n.

Head brownish gray; thorax reddish brown, darker medially.

♀.—Length, 8.5 mm.; wing, 9.6 mm.; fore leg, femur, 5.9 mm.; tibia, 7.3 mm.

♀.—Head; rostrum, palpi and antennæ dark brown. Front, vertex and occiput brownish gray.

Thorax: pronotum yellowish brown. Mesonotum, præscutum reddish brown, darkest brown medially on præscutum; paler, yellowish, on the humeral angles; pleuræ brownish yellow, brightening to yellow on the sternum. Halteres long, slender, brown, brighter at the base. Legs long, slender; coxæ and trochanters yellowish; femora yellowish brown; tibiæ and tarsi brown. Wings hyaline, veins light brown; stigma barely indicated, rectangular, very pale. Venation (see fig. i.): Sc short, Sc_2 quite removed from the tip of Sc_1 ; Rs short, not much longer than the deflection of R_{4+5} ; basal deflection of Cu_1 far before the fork of M .

Abdomen: tergum dark brown on the basal segments, lighter brown on the apical segments; sternum light brown.

Holotype.—♀. Iquico, Peru. (Received from Staudinger-Bang-Haas.)

Type in author's collection.

This species cannot be referred to *pallida* Macq., which has a triangular cell 1st M_2 which bears a spur, this character of an appendiculate cell also separating *elquiensis* Blanch. The other species with unspotted wings, *flavida* Phil. and *chlorotica* Phil., are quite different insects, specimens of which are before me, and will be redescribed in a later paper.

Furcomya argentina, sp. n.

Head gray; thorax gray, darker on dorso-median line.

♀.—Length, 8 mm.; wing, 8.9 mm.; fore leg, femur, 6 mm.; tibia, 7 mm.; hind leg, femur, 7.1 mm.; tibia, 7.7 mm.

♀.—Head: rostrum and palpi dark brown. Antennæ dark brown, grayish pollinose; segments submoniliform. Front, vertex and occiput gray.

Thorax: pronotum brownish gray, the gray being pollen. Mesonotum, præscutum gray, with an indistinct, broad, brown, median stripe; scutum, scutellum and postnotum pale, with a gray pollen. Pleuræ pale

gray pollinose. Halteres short, stem dull yellow, knob brown. Legs : coxæ and trochanters dull yellow ; femora similar, rather darkened toward the tip ; tibiæ and tarsi light brown. Wings hyaline, veins dark brown, conspicuous ; stigma indistinct, brownish. Venation (see fig. k.) : Sc ends opposite the origin of Rs ; Sc₂ far retracted so that Sc₁ is almost as long as the stigma ; Rs only a little longer than the deflection of R₄₊₅ ; basal deflection of Cu₁ at the fork of M.

Abdomen: tergum dull brown ; sternum yellowish brown.

Holotype.—♀. Neuquen, Argentina, 1907. (Dr. Adolf Lenol.)

Type in author's collection.

Differs from the hitherto described species by the characters given in under *insignifica*. From *insignifica* it differs in its wing venation, colour of veins, and body tone.

? *Furcomyia fumosa*, sp. n.

Wings infumed, with darker clouds.

♀.—Length about 5.5 mm ; wing, 6.3 mm.

♀.—Head : rostrum and palpi dark brown. Antennæ dark brownish black. Front, vertex and occiput brownish, with a grayish pubescence.

Thorax : pronotum dark brown. Mesonotum light brown, the postnotum darker. Pleuræ dark brown. Halteres dark brown, base of the stem light coloured. Legs : coxæ and trochanters dark brown, rest of legs broken. Wings infumed with brown, darker brown clouds arranged as follows : At origin of Rs, at tip of Sc, at tip of R₁, along cord ; most of veins and tip of wing clouded with dark brown. Venation (see fig. t.) : Sc long, Sc₁ ending slightly before the fork of Rs, Sc₂ at its tip ; R₁ bends down near its end and touches R₂₊₃, obliterating the cross-vein *r* ; basal deflection of Cu₁ beyond the fork of M.

Holotype.—♀. Amatuk, British Guiana ; July 14, 1911. (F. E. Lutz.)

Type in American Museum of Natural History.

This insect is closely allied to *Limnobia insularis* Will. (Dipt. St. Vincent, Trans. Ent. Soc. Lond., 1896, p. 287, pl. 10, fig. 58), but the wing has quite a different pattern, cell 1st M₂ less elongated, basal deflection of Cu₁ farther distad, etc. The two species are certainly as close to *Furcomyia* as they are to *Limnobia*, but seem to represent a peculiar group which needs further study with more material.

MR. EDWARD P. VAN DUSEE, of Buffalo, leaves early in December for a four months' vacation in California. His temporary address will be San Diego, Calif.

SYNONYMICAL NOTES ON OEDIONYCHIS

BY F. C. BOWDITCH, BROOKLINE, MASS.

In the rearrangement of my Oedionychis material I note the following:

In the Biologia, p. 418, speaking of *oculata* Fabr., Mr. Jacoby mentioned a figure of a species taken by himself. This figure is now before me, and agrees exactly with a specimen I have from Cayenne (typical locality). I think additional material will prove that the Central American form is distinct.

The name *illigeri* (Jac.) Proc. Zool. Soc., 1905, p. 441, for a Trinidad species was previously used in the Biologia, p. 421, for a Panama insect, so I would suggest for the later form the name *trinidadensis*.

The name *inconspicua* (Jac.) l.c., p. 424, for an Amazon form, was previously used in the Biologia, p. 417, for a Mexican species, so I would suggest for the later form the name *amazona*.

The name *colombiana* (Jac.) l.c., p. 445, was previously used in the same paper, p. 427, evidently some uncorrected error, for the species described on p. 445. I suggest the name *confusa*.

The name *rustica* (Jac.) l.c., p. 433, for an Argentine form, was previously used by Von Harold, Deut. Ent. Zeit. XXI, p. 434, for a species from Bahia. For the Jacoby species I suggest the name *similis*.

The name *intersignata* (Jac.) l.c., p. 433, for a species from Espirito Santo, Brazil, was previously used (P. Z. S., 1894, p. 617), for a form from Surinam. I suggest the name *santoensis* for the Brazilian form.

Asphaera femorata (Jac.) seems to me the same as *chontalensis* (Jac.).

In explanation I would add that the late Mr. Jacoby in his working current catalogue (since 1885), for some reason or other, had not entered such of the "Biologia species" as were published after the date of Duvivier's list, so that all the names he used in the Biologia were not before him when he wrote in 1905.

NOTES ON SYNTOMASPIS DRUPARUM BOH.
AND ICHNEUMON NIGRICORNIS BERGER

BY C. R. CROSBY, ITHACA, N.Y.

In Bulletin 265 of the Cornell Agricultural Experiment Station, April, 1909, I gave an account of the habits of the Apple-seed Chalcis, (*Syntomaspis druparum* Boh.), and a resumé of the literature known to me at that time. Since then three more important papers have come to my notice.

December, 1912

In 1888 Dr. D. H. R. von Schlechtendal (Zeits. f. Naturwiss., Halle, ser. 4, VII., (LXI.), p. 416) records having reared this insect from the seeds of *Cratægus*. He states that the insect usually spends two or three winters in the larval state, only rarely emerging the first spring. He observed oviposition and found that the egg is deposited in the kernel. The ovipositor is inserted through the micropyle, the seed coat being very hard and thick.

In my former article I stated that the first account of this insect was given by Guérin-Méneville in 1865. This is an error, for over sixty years before Francois Berger of Geneva, Switzerland, published (Bull. Sci. Soc. Philomatique Paris, An. XII, 1803, p. 141—wrong pagination for 241) a brief account of its habits and gave excellent figures of the larva, pupa and adult. This article has been overlooked so long because the insect was identified as *Ichneumon nigricornis* Fab. It is catalogued by Dalla Torre as *Ichneumon nigricornis* Berger although Berger stated that Jurine believed it should go in the genus *Chalcis*. The *Torymus nigricornis* of Boheman (Svensk. Vet.—Akad. Handl. p. 355, 1833) to which *Ichneumon nigricornis* Fabr. has been referred by Dalla Torre is an entirely different insect.

Soon after the publication of Bulletin 265 I obtained a copy of a paper entitled, "Commentatio de Torymidis, quarum larvæ in seminibus pomacearum vitam agunt," by W. N. Rodzianko, 1908, in which he gives an excellent review of the literature relating to *Syntomaspis druparum* and gives an extensive account of careful rearing experiments.

THE MIGRATION OF *ANOSIA PLEXIPPUS* FAB.

BY F. M. WEBSTER, WASHINGTON, D.C.

Regarding a phenomenon that has attracted so much attention, as has the migrations of the milkweed butterfly, among scientific men both at home and abroad, more especially of entomologists, we seem to possess a surprisingly limited amount of definite information. These migrations have been frequently reported in the newspapers and they are often observed by entomologists, as they appear to take the form of scattered bands, but where the members of these bands originate no one seems to know. Not all of the butterflies in a locality join the migration, as, after the bands have appeared from out of the north and passed onward toward the south, there are many others left behind. At least, this is true in the United States, and the writer has observed three of these migratory bands in the last twenty years.

September 21, 1892, in the clear, calm afternoon, there were swarms of these butterflies flying about in the city of Cleveland,

Ohio, on the south shore of Lake Erie. Whether the members of this band were migrants from the shores of Hudson Bay and Lake Athabasca, far away to the northwest, or whether they had gathered there from the east or west it was of course impossible to say.

The next band to be observed was at Urbana, Illinois, September 12, 1902, also in the afternoon, but at a temperature of 55° Fahr., with a brisk northwest wind and clear sky. Either this or another band of butterflies of this species was reported at Milledgeville, Illinois, about 160 miles to the northwest of Urbana, three days prior, while evidently still another was reported at Hoopstown, Illinois, some 35 to 40 miles north-east, a few days later. Whether or not these all belonged to the same band of migrants, from whence they came, or how the members came to be associated together, is still an unsolved problem. At Urbana, the company moved away on the morning of the 13th, but the usual number were observed wandering about, in a perfectly natural way, during the remainder of the month.

The third migration, observed by the writer, took place on September 12, about 3 p.m., on the Mall in Washington, D.C. The weather was cold, with light n.w. wind, but the sky was unclouded. This last, however, was not further investigated.

The daily press of Chicago, Illinois, September 13, one day prior to the occurrence in Washington, called attention to swarms of this butterfly observed congregating in the parks and gardens of the city and starting southward on their journey.

While it is true that this insect is of no economic importance, and of far too common occurrence to interest the collector, yet it seems to me that studies of the migrations of this species are well worth while, and the results would, beyond a doubt, prove of material aid in studying a similar habit in much more important species. The migration of insects is of itself an interesting problem, and a little care in observing and recording the appearance of these migrations and under what conditions these took place, would surely repay the many entomologists, amateurs and professionals scattered over Canada and the United States.

ON THE STATUS OF SOME SPECIES OF THE GENUS PANURGINUS.

BY J. C. CRAWFORD, WASHINGTON, D. C.

In a paper on the bees of Nebraska,* Messrs Swenk and Cockerell say that a comparison of cotypes of *Panurginus nebrascensis* with specimens of *P. ornatipes* shows that the two are synonyms and that *P. boylei* is a subspecies. The types of all of the involved

*ENT. NEWS, XVIII., 183, 1'07.

species being in the collections of the U.S. National Museum has led to a re-examination of them and the characters given show them to be abundantly distinct. In view of these characters, what Messrs. Swenk and Cockerell had under the name *ornatipes* is somewhat of a mystery.

Panurginus ornatipes Cresson.—Male type: Process of labrum emarginate; punctures covering clypeus; punctures of mesoscutum small, sparse, at median anterior margin the punctures more sparse than at sides; a yellow stripe exteriorly on middle tibiae (hind tibiae missing, but in a specimen from Paris, Texas, which is certainly conspecific with the type, the hind tibiae have a similar stripe); wings yellowish and slightly dusky.

Panurginus nebrascensis Crawford.—Male type: Process of labrum rounded apically, punctures covering clypeus; punctures of mesoscutum, large, close, at anterior ends of parapsidal furrows separated from each other by about the diameter of a puncture; punctures at median anterior margin of mesoscutum finer and crowded; middle and hind tibiae completely annulate with black; wings dusky, more so apically.

Panurginus boylei Cockerell.—Male type: Process of labrum emarginate apically; clypeus with a median impunctured space which has a median depressed line; punctures of mesoscutum as large as in *nebrascensis* but not crowded along anterior median margin; middle and hind tibiae completely annulate with black; wings slightly yellowish.

NOTE ON VANESSA CALIFORNICA AT PEACHLAND, B. C. IN 1912.

BY J. B. WALLIS, WINNIPEG, MAN.

A somewhat remarkable visitation of *Vanessa californica* came to my notice when in Peachland, B. C., during July, 1912.

Almost immediately on my arrival I was questioned concerning a caterpillar (descriptions decidedly remarkable!) which had occurred in such numbers as to defoliate its food-plant, and had been compelled to migrate by thousands. I was also told of the appearance, in very large numbers, of a brown butterfly which was believed to be connected with the "worms."

In neither of my two previous visits (1907-9) had *californica* been seen, so I was quite at a loss to place a caterpillar whose food-plant was *Ceanothus* sp.

Next day the problem was solved. On going a mile or two into the hills, *californica* was found in very great numbers. There must have been many thousands of them, and in favored spots they almost filled the air. Being in a wagon, I made little effort to secure specimens, although five were taken at one almost aimless sweep of the net.

December, 1912

Four days later I made a special trip after *californica*, but, with the exception of three deformed specimens, not one was seen, and during the remainder of my five-week stay not more than a dozen were noticed.

It would be interesting to know if a large influx of this beautiful butterfly was noted in any locality.

Practically every plant of *Ceanothus* was entirely defoliated, and the pupa cases were hanging everywhere. Nine were counted on a twig four inches long, eight on another five inches long, and so on; while some young pine trees about seven feet high looked to be well laden with strange fruit.

The percentage of parasitism appeared to be very small. I did no actual counting of large numbers, but estimated it was no greater than one per cent.

ON THE LARVA OF *PLEUROPRUCHA* (*DEPTALIA*) *INSULSARIA* GUEN.

BY LOUIS B. PROUT, LONDON, ENGLAND.

My esteemed correspondent, Dr. Eugenio Giacomelli, of La Rioja, Argentine Republic, recently sent me the description of the larva and pupa of a small Geometrid moth unknown to him, together with imago bred therefrom. Knowing how extremely little had yet been done with the early stages of the Neotropical *Geometridæ*, he naturally hoped that his discovery might prove entirely new. This is not actually the case, for the moth turns out to be the very widely distributed *Pleuroprucha insulsaria* Guen. (var. ? *asthenaria*, Walk.; compare my memoir on the Argentine *Geometridæ*, Trans. Ent. Soc., Lond., 1910, 215.) But as the larva is evidently very variable, and it seems likely that the Southern form constitutes a local race, it is well worth while to give a translation of Dr. Giacomelli's note on his larva. His account of the pupa, both as to its structure and its activity, agrees very exactly with Hulst's (Ent. Amer., 3, 175, 1887, erroneously as *Acidalia "insularia"*).

"Ground color delicate green, more intense dorsally, ventral region glaucous green; above on the central segments three small, crescent-shaped spots, yellow, paler than the ground; mediodorsal and lateral lines also paler. Setæ simple, not numerous, short, inconspicuous. Later it changes color as follows: The delicate green becomes glaucous, the longitudinal lines a dull vinous red, laterally and dorsally, between them some round dots of the same colour [the tubercles], bearing the short, simple hairs.

"The larva lives on *Prosopis* (Mimosæ) and *Acacia ripari* (Mimosæ). It pupated five days after I took it, so that it would appear that the change of colouring indicates that the transformation from caterpillar to chrysalis is near at hand."

December, 1912

I am indebted to Mr. Grossbeck for calling my attention to Hulst's descriptions, as well as a note by Bruce (Ent. Amer., 3, 48), to the effect that he bred the species from the egg of *Galium*. Packard gives *Celastrus scandens*, and it is evidently not very particular about its food.

THE SECOND INTERNATIONAL CONGRESS OF ENTOMOLOGY.

BY HENRY H. LYMAN, MONTREAL.

I confess that it is with considerable diffidence that I approach the above subject. Reports of the meeting have already been published by Mr. H. Rowland-Brown in "The Entomologist," and by the Canadian Government representative, Dr. C. Gordon Hewitt, in this journal, but there are certain aspects of the subject which these gentlemen have not dwelt upon that appear to me, at least, to be of considerable importance.

I hope I am not wrong in assuming that the *raison d'être* of an international scientific congress is primarily to study the subject in its international aspect, and to secure, as far as possible, co-operation among the scientists of all the countries represented, and that this aspect should never be lost sight of. Yet, it appears to me, as one who has attended both congresses so far held, that this aspect was less in evidence at the Oxford meeting than at the one held two years previously at Brussels; while the social aspect, which was almost absent in Brussels, was very strongly developed. I fully admit the agreeable nature and also the important character of the social aspect, but I think there is a danger of overdoing it, and that it should never be allowed to obscure the more serious business of the gathering.

These congresses being from now on held only every three years, and, considering the very considerable expense incurred by governments and institutions in sending representatives to them, is it not of the highest importance that they should not be merely very pleasant reunions where highly interesting papers are read by eminent scientists, and where afterwards the pipes of social peace are smoked around the social board, but that the many pressing questions of international importance should be given first place and some attempt made to solve them, instead of referring them to committees from one congress to another, while every year confusion, at least in nomenclature, is becoming worse confounded? It is quite true that some attempt was made by some authors to deal with matters of international concern, but such attempts were few, and, unfortunately, some of the ideas were crude.

The programme, including the President's annual address,

comprised about fifty-five papers, but of these not more than ten were of international or semi-international interest.

Mr. Charles Oberthur in his paper advocated the adoption of a rule that no description should be accepted as valid unless accompanied by a good figure. Such an idea could not, of course, be entertained, for, apart from the difficulty of determining what is a good figure, it would, in the absence of highly-endowed journals or expensive government publications (which would only be open to official entomologists), throw the work of describing new species into the hands of wealthy entomologists who could afford to furnish the illustrations.

The suggestion of Mr. Ernest Olivier, that the Latin language should be used in all entomological descriptions is equally impracticable; and, even if it could be adopted, would certainly not mend matters, judging from the extremely meagre and inadequate Latin descriptions of the past.

The centralization of diagnostic descriptions, advocated by Mr. E. E. Green, while a consummation devoutly to be wished, seems impossible of attainment, but certainly a great improvement over the present chaotic condition could be made by a little co-operation between the entomologists of each country.

Of the other papers of international import, the only ones which led to any action were those by Mr. A. G. L. Rogers and Messrs. Wheeler and Bethune-Baker, the latter being accompanied by a communication on nomenclature from the Entomological Society of London, which led to important action being taken, as detailed by Dr. Hewitt.

There is another point which certainly merits consideration, and that is the serious disproportion among the representatives of the different nations, the English members of the congress equalling, if not outnumbering, the representatives of all the other countries combined. This was referred to by one of the German entomologists to whom I spoke while waiting on the Tring platform for the London train, who pointed to the whole page of names of English representatives, and said there were too many.

Disproportionate representation is, of course, inevitable, as there will always be a fuller representation of the entomologists of the country in which the congress is held, but if it should ever be desired to settle any disputed point by majority vote, some scheme of proportional voting power would probably have to be adopted.

If the congress could be brought to seriously consider and decide such questions as to whether or not the law of priority should be rigidly enforced in all cases, irrespective of consequences, whether the Tentamen of Hubner should or should not be recognized, and similar troublesome questions, it would do more to justify its existence than it has yet done.

BOOK NOTICE.

HOUSE FLIES AND HOW THEY SPREAD DISEASE. By C. G. Hewitt, D. Sc. (The Cambridge Manuals of Science and Literature, Cambridge; the University Press. One shilling.)

Although in the last few years the public has at last become more or less awake to the fact that the house fly is not merely a troublesome nuisance but a serious enemy of mankind, few even among the educated realize the many ways in which this ubiquitous insect can make itself a source of danger to public health. The present little book is just what has been needed to bring this important matter home to the public mind and we believe it will have a far-reaching influence in increasing such efforts as are being made to keep this pernicious insect under control.

The book is not a record of new observations, the subject matter having already been set forth at much greater length in Dr. Hewitt's earlier work—"The House-fly: A Study of its Structure, Development, Bionomics and Economy."* It is written for the benefit of the layman, and it has been the author's endeavour "to avoid as far as possible the use of technical terms unfamiliar to the lay mind and the inclusion of matter which is of interest chiefly to the specialist." In this aim we think he has been eminently successful, the book being written in a clear, simple style, as easy to read as a novel.

Of the two parts into which the book has been divided, the first deals with the natural history of the fly; the second with its relationship to disease. In Part I. the author has wisely restricted the description of the fly's structure and metamorphosis to such features as are necessary to a proper understanding of the general facts of its life history. In this part are also given short accounts of other species of flies commonly found in houses and of the parasites and natural enemies of the house-fly. In Part II. the relationship of flies to a number of diseases is discussed, a special chapter being devoted to the important *role* which they play in the dissemination of typhoid fever and the summer diarrhoea of infants. In the last chapter is a full description of the methods of control which a thorough study of the fly's life history have proved to be most efficient in destroying it.

The little volume, which is small enough to be carried in one's pocket, has a most attractive appearance, the paper and print being of excellent quality and the illustrations, with few exceptions, are reproduced from the beautiful plates which accompanied the author's earlier work on the house-fly (l.c.). The quaint design on the title page is a reproduction of one used by the earliest known Cambridge printer, John Siberch, 1521.

*Manchester University Press, Biological Series, No. 1, 1910.

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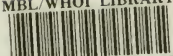
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